AGRICULTURE WEATHER SERVICES

HEARING

BEFORE THE

SUBCOMMITTEE ON NATURAL RESOURCES,
AGRICULTURE RESEARCH AND ENVIRONMENT

OF THE

COMMITTEE ON
SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

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AGRICULTURE WEATHER SERVICES

THURSDAY, MARCH 31, 1983

House of Representatives,
Committee on Science and Technology,
Subcommittee on Natural Resources, Agriculture
Research and Environment,
Washington, D.C.

The subcommittee met, pursuant to call, at 10:15 a.m., in the County Commission Chambers, Palm Beach County Courthouse, West Palm Beach, Fla., Hon. James H. Scheuer (chairman of the subcommittee) presiding.

Staff present: Jim Greene, science consultant and Mary Beth McJury, minority technical consultant.

[The prepared statement of Mr. Scheuer follows:]

Prepared Statement of James H. Scheuer

The Subcommittee will come to order. Today the Subcommittee on Natural Resources, Agriculture Research and Environment is pleased to welcome a number of distinguished witnesses who will present their views of the importance of the agriculture weather services provided by the National Weather Service.

Agriculture weather services constitute only a tiny fraction of the vast Federal budget. In 1983, approximately $1.5 million has been budgeted by the National Weather Service to provide farmers in over 40 States with information needed to irrigate crops, to protect them from frost, and to plant, fertilize, spray, and harvest at the optimal time. Yet, for the past two years, the Administration has proposed eliminating all agriculture weather services on the grounds that they are "specialized" for a narrow interest group, and that the private sector could easily provide agricultural weather services should the government withdraw from the field.

The Congress has not agreed with this assessment. Last year, we in the Congress voted overwhelmingly to restore the agricultural weather program, and I predict the same result this year. The Congress has restored these programs because it has been impressed by the testimony of many witnesses, including Mr. Bobby McKown of Florida Citrus Mutual, on the cost-effectiveness of agriculture weather services.

At a hearing before this Subcommittee in Washington on March 9 of this year, several witnesses explained that the benefits to American farmers from these services far outweigh the relatively minor cost of the program to the taxpayers.

However, hard evidence of the positive cost-benefit ratio for these programs has been lacking. Since that hearing, however, our Subcommittee has been provided with a study by the National Weather Service which indicates just how valuable agriculture weather services really are. The study was prepared by the Western Regional Office of the Weather Service in 1982 and includes these facts and figures: $125,000 in fire weather services produced savings of between $12-31 million; the value of all weather support to California agriculture exceeds $250,000,000; and benefits accrued to a wide variety of farmers (cattle, dairy, grapes, nursery, cotton, citrus, deciduous fruits, vegetables); and the value of the frost program in California exceeds $70,000,000.

In this report we see an admission by the National Weather Service of the inherent value of these services. Without objection, I would like to insert this study into the hearing record at this point. The major objective of this field hearing is to examine first-hand the benefits that agriculture weather services provide to the major agriculture producing areas of Palm Beach County, and to one of this country's great agricultural states—the state of Florida.

We will hear testimony today from the Florida Department of Agriculture, on the importance of these services to the agricultural economy of the State. We will also hear from the forecasters who provide the fruit frost advisories out of the Ruskin, Florida weather station, and from a variety of farmers and growers who rely on these services. Finally, we look forward to hearing from Mr. Clayton Hutcheson of the University of Florida, who will demonstrate some of the newer computer-based technologies which are revolutionizing agricultural weather forecasting. We hope in these hearings to establish the value of agricultural weather services and to determine whether the National Weather Service or the private sector is better equipped to provide these services.

Mr. SCHEUER. The Subcommittee on Natural Resources, Agriculture Research and Environment will come to order. We will commence our hearing here in Palm Beach County on the agriculture weather services.

We are very happy to be here and know that this is an enormously important subject for this rich and productive agricultural region.

To conduct the hearing, I would like to call on our distinguished and highly respected colleague from this area, the Congressman from the 12th Congressional District, Tom Lewis.

Tom, would you please come up here and take over.

Mr. LEWIS. Thank you very much, Mr. Chairman, for the opportunity to chair the subcommittee hearing. It is a first for me, being a new Member of Congress.

I would like to thank Chairman Scheuer for holding this meeting in this area, and for allowing the people of south Florida to voice their opinion on the weather station problem.

I would like to join the chairman in welcoming our distinguished witnesses here this morning. Also I would like to say how very pleased I am that you agreed to hold this hearing, Mr. Chairman, because I believe it is most important to all these people as this is the fifth largest agriculturally productive area in the United States.

The agriculture weather services provided by the National Weather Service are critical to our local economy as well as to that of the entire State of Florida. Florida ranks first worldwide in citrus production and second nationwide in winter vegetable production. My State alone furnishes 50 to 60 percent of the Nation's winter fresh vegetable needs, and for some crops such as potatoes, sweet corn, and cabbage, Florida is the sole producer.

Farmers statewide depend on the Ruskin Weather Station for around the clock, up-to-date and accurate reports of approaching cold fronts and storms. This information is critical during the main growing season, which is November through March.

The acreage of land involved is massive: 850,000 acres of citrus; 400,000 acres of vegetables; 350,000 acres of sugar cane; and 150,000 acres of commercial nurseries. Furthermore, they are billion dollar industries.

The Ruskin facility utilizes the most technologically advanced equipment to insure the accuracy of weather reporting. Should Congress approve the administration's proposed budget cuts for NOAA, the alternative for Florida farmers would be to seek the frost warning services from a private firm.

However, there is considerable debate regarding whether the services currently available through such private enterprises are comparable in quality to those provided by the National Weather Service.

I certainly share the administration's concern for reducing budget deficits and support their efforts to halt the growth of Federal spending. However, I believe this is one example of the OMB attempting to save money in the wrong area.

Furthermore, the cost of maintaining the Ruskin station and of operating a fruit frost warning program is a drop in the bucket compared with the value that this critical information provides to all farmers and growers in States like Florida, California, Texas, and other Southwestern States.

I believe the continued operation of the frost warning service at Ruskin will serve a positive purpose. Until we can be absolutely sure that weather will be reliable, we need to provide our farmers with as much accurate information as we can in order to insure all of us an abundant supply of fresh fruits and vegetables in the winter months.

I want to thank you again, Mr. Chairman, and I look forward to hearing the testimony of the expert witnesses.

Mr. McGrath, our ranking member, do you have an opening statement?

Mr. **McGrath**. Thank you very much, Mr. Lewis. I would just like to say that I am extremely happy to be here in the 12th District of Florida with my dear friend and colleague, Tom Lewis, who in a short period of time in Congress has distinguished himself as an able and valued member of the Science and Technology Committee and the NRARE Subcommittee.

I would also like to say that I am happy to be here with my colleague from New York, our chairman of the subcommittee, Jim Scheuer. We probably, between both of us, we have contiguous districts in New York City and Long Island, we don't have a victory garden between us in our districts, but we are certainly aware of the problems that confront the agricultural growers here in south Florida, particularly in Tom's district, the 12th District.

Tom has brought a great leadership to our committee and subcommittee and specifically in the important area of agricultural weather services as it affects the growers here in south Florida.

I am looking forward today to learning from our distinguished panel of witnesses about the weather forecasting needs of the growers in south Florida, and I am sure that this information will be extremely valuable to our subcommittee as we make decisions regarding the 1984 budget request in this area. I can assure you, Tom, as the ranking minority member of this committee, that I am going to support you in your efforts to restore moneys for this important service, and I thank you for inviting me here to your district.

Mr. **Lewis**. Thank you, Mr. McGrath.

Mr. Chairman, do you have any statements you would like to make at this time?

Mr. **Scheuer**. Well, only to say at this time that I am very happy that you consented to chair this hearing. I am just a street fighter from Queens, and I know very little about agricultural economics.

You are steeped in it. You have brought great sophistication and insight to the work of our committee, and I thought it was only right and proper that we harness the best talent, the most incisive judgment in our committee to run this important hearing, so I am very happy you agreed to do the job and I know that it will be a very productive hearing.

Mr. **Lewis**. Thank you, gentlemen, for those kind words.

Our first witness this morning will be Mr. John Stiles, from the Florida Department of Agriculture. If you will come up, Mr. Stiles.

Mr. Stiles, your entire written statement will be entered into the record of the committee. Therefore, in the essence of time, we would like you to give us a 10-minute summary and then answer some questions.

STATEMENT OF JOHN D. STILES, DIRECTOR, DIVISION OF MARKETING, FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES, REPRESENTING DOYLE CONNER, COMMISSIONER OF AGRICULTURE, FLORIDA DEPARTMENT OF AGRICULTURE

Mr. **Stiles**. Thank you, Mr. Chairman.

Mr. Chairman and members of the subcommittee, ladies and gentlemen, I am John Stiles, director of the division of marketing for the Florida Department of Agriculture and Consumer Services.

I am pleased today to represent commissioner of agriculture for the Florida Department of Agriculture, Commissioner of Agriculture, Doyle Conner, whose schedule prevented him from being here in person.

I wish to have my testimony recapped as Commissioner Conner's views on the importance of maintaining and preserving, and where possible, enhancing the agriculture weather services.

There are many benefits the consumers receive from the weather information that is made available here in the State of Florida.

We are justifiably proud of our agricultural economy. We have developed one of the most diversified production systems in the world, with 52 products of major commercial economic importance in the marketplace. We have an investment in agriculture of more than $20 billion, on 41,000 farms. We have annual cash receipts from farming in Florida now over $4 billion. Our State ranks third in the Nation in terms of net income to farmers' operations.

With specific reference to the provision of the agriculture weather station to Florida producers to need to have a level of weather forecasting capabilities.

I might say that when we talk about market information, which is gathered in our division of marketing, we have market prices, market truck information, but weather information would be in this same category, and these are joint programs that we have with the Federal Government.

We cannot control the weather situation, so our views from the marketing standpoint is that the producers do not realize any benefit from their cost of investments and labor until they take their product to the consumer and the cash register rings, and that is when the product starts bringing money back to the producer.

If this does not happen, all of the efforts of that producer have been wasted as he makes his efforts to produce the product.

When we have adverse weather conditions we have real complications in the marketing system. And who is going to pay for that system? There is a real cost here. And yet at the same time the farmer needs to know what is going on. If he does know, he is able to prepare for it and to meet that challenge, whatever, the adverse weather conditions are.

We are convinced that the social cost of provisions of agriculture weather services to general taxation is so minor in terms of the social benefits that it is almost infinitesimal as far as the moneys that are concerned. In other words, less than one one-thousandths of the annual value of farm products sold at the producer level, would be used on a program of this type.

So Federal spending for a public works project usually can be justified, and usually you say if you will get a little bit better than the majority back it is justified. Here it is much, much more than that.

Florida experienced major freezes in January 1981 and 1982, and the frost warnings issued by our weather station in Ruskin were a major factor in minimizing losses to the cold weather. By using this information at the right time and, by the way, you will hear from the farmers later because they follow the weather on an hourly or almost a minute basis during a freeze to find out exactly what is taking place, when they need to fire up, et cetera, because with time and proper information that they can control the weather to a certain amount.

So you will get more information on that later, I am sure. But the vegetable growers, with adequate warning of an oncoming freeze, will be able to speed up the harvesting immediately so that they can make these products available to the consumer and they can also make some arrangements in putting heat into the groves or into the fields at that time to save part of the products.

On a broader scale, it has been pointed out many times that weather information is vital to farmers who are forced to use chemicals to protect our food supply against diseases. They must know what the weather is going to do in the way of rainfall, because once you put chemicals on, the reaction may take place after the rainfall happens or the rainfall may wash it off, so it's real important that they know exactly what the rainfall will be and when it is coming.

Many farmers here in Florida and indeed throughout the United States are suffering from a combination of high costs and low returns, and I think you are well aware of the squeeze that the farmer is in today, that it's real, real drastic at this time. This weather service can help prevent further decline in the farm income that the farmers are receiving.

Basic economics suggest that there are two ways we have to help farmers break even or make a small profit: Keep costs at a minimum or allow them a higher price for their products. And, of course, we know the attitude of price supports; so then we have got to keep the cost at a minimum, and this is one thing that the weather stations will do.

It has been suggested that farmers are the chief beneficiary of agricultural weather information and therefore should be paying for all of the services. There is another view, and I think this view does not reflect reality, because this is a consumer-oriented program that we are talking about as well as a farmer program.

There is also contention that if a user's fee should be adopted. There is no economical formula in existence that we could put this on an equal basis at this time, because the farmer pays through taxation the same as a consumer does and then through higher prices the consumer pays, for this, so I don't know of any alternative system that we could use here that would make it possible to pay for an economic formula that everybody could pay on an equal basis, but I think the system that we have today is the most reliable system that we have.

Federal programs for farmers in Florida in 1981 were just short of $11 million. The 1982 figures have not been released this time. The majority of these costs are conservation programs for grain support and for conservation programs that I mentioned.

But citrus and vegetables industries have no Federal program at this time, and I don't think that they want to be under any Federal program, but they would like to see continuation of a weather program of this type that would give them the information they need on a timely basis.

What of the future? The University of Florida recently completed a study of Florida agriculture in the 1980's, and one conclusion was that we will have a dual system of agriculture. We are going to have an increase in the number of small farms, and probably about the same in large and medium size farms.

If we change the system the smaller farmers are the ones who are going to lose, because they aren't going to be able to pay for this information from any other source, so they will not have this information and will not be competitive in the marketplace.

The larger producers who are well financed will have the option of continuing to receive weather information. As a lot of them are at the present time, through private sources, and they will be in a bargaining position that your small farmers will not be in.

Now I am aware that there has been considerable study already by various commissions on this subject. There are proposals for increasing national investment, improving the system, and there are proposals for selling off parts of the system to reduce Federal direct costs.

I submit that these decisions are way down the road and it will be quite a few years before they become a reality. Meanwhile, we do not need to debate the desirability for continuing the minimal service now provided our farmers by the weather station at Ruskin. That point was settled many years ago.

We most urgently recommend the reauthorization of the budget for the National Oceanic and Atmospheric Administration, that the Congress require NOAA to continue the present level of weather capabilities and manpower for the duration of the authorization.

We further recommend that Congress encourage the National Weather Service to cooperate with the National Aeronautical and Space Administration, to continue the development of enhanced frost warning capabilities and weather information disseminated through all possible channels for the benefit of agriculture in Florida.

Mr. Chairman, I appreciate the opportunity of presenting this information. I would be pleased to respond to any questions.

[The prepared statement of Mr. Stiles follows:]

STATEMENT BY JOHN D. STILES
DIRECTOR, DIVISION OF MARKETING
FLORIDA DEPARTMENT OF AGRICULTURE
AND CONSUMER SERVICES

MR. CHAIRMAN, MEMBERS OF THE SUBCOMMITTEE, LADIES AND GENTLEMEN:

I AM JOHN D. STILES, DIRECTOR OF THE DIVISION OF MARKETING FOR THE FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES.

I AM PLEASED TODAY TO REPRESENT COMMISSIONER OF AGRICULTURE DOYLE CONNER, WHOSE SCHEDULE PREVENTED HIM FROM BEING HERE IN PERSON.

I WISH TO HAVE MY TESTIMONY REGARDED AS COMMISSIONER CONNER'S VIEWS ON THE IMPORTANCE OF MAINTAINING AND PRESERVING -- AND WHERE POSSIBLE -- ENHANCING THE AGRICULTURE WEATHER SERVICES.

THESE SERVICES BENEFIT ALL CONSUMERS OF FARM PRODUCTS IN THIS COUNTRY AND IN MANY MARKETS IN FOREIGN COUNTRIES.

FLORIDA IS JUSTIFIABLY PROUD OF ITS AGRICULTURAL ECONOMY. WE HAVE DEVELOPED ONE OF THE MOST DIVERSIFIED PRODUCTION SYSTEMS IN THE WORLD, WITH 52 PRODUCTS OF MAJOR COMMERCIAL ECONOMIC IMPORTANCE IN THE MARKETPLACE.

WE HAVE AN INVESTMENT IN AGRICULTURE OF MORE THAN $20 BILLION INCLUDING 41,000 FARMS, EXCLUSIVE OF THE VALUE OF FARM HOUSEHOLDS.

WE HAVE ANNUAL CASH RECEIPTS FROM FARMING IN FLORIDA NOW OF SOME $4 BILLION, AND OUR STATE RANKS THIRD IN THE NATION IN TERMS OF NET INCOME TO FARM OPERATORS, TRAILING CALIFORNIA AND TEXAS IN THIS CATEGORY OF STATISTICAL RANKING.

WITH SPECIFIC REFERENCE TO THE PROVISION OF AGRICULTURAL WEATHER SERVICE TO FLORIDA PRODUCERS, OUR INTEREST IS IN CONTINUING THE MINIMUM LEVEL OF WEATHER FORECASTING CAPABILITY THAT WE NOW HAVE. WE MUST BE PREPARED TO AVOID LOSSES WHICH ADVERSE WEATHER CAN BRING TO AGRICULTURE.

WEATHER ADVISORIES ON A TIMELY BASIS ARE VITAL TO FARMING.

OUR VIEW FROM THE MARKETING STANDPOINT IS THAT PRODUCERS DO NOT REALIZE ANY BENEFITS FROM THEIR COSTLY INVESTMENT AND LABOR UNTIL THEIR PRODUCTS CHANGE HANDS AT THE MARKET. UNLESS THE PRODUCER CAN PUT HIS HARVEST IN THE MARKETPLACE, HE HAS WASTED HIS EFFORT, TIME AND MONEY IN PRODUCING A PRODUCT.

WHEN ADVERSE WEATHER PREVENTS A FARMER FROM PRODUCING AN ACCEPTABLE PRODUCT AND GETTING IT TO THE MARKETPLACE IN A FORM WHICH IS DESIRED BY CONSUMERS, OUR ENTIRE ECONOMY SUFFERS. THIS COST IS NOT BORNE SOLELY BY THE PRODUCER, WHO IS THE FIRST VICTIM, BUT BY THE ENTIRE CONSUMING PUBLIC, AND IS IN FACT A SOCIAL COST.

VARIOUS GOVERNMENT PROGRAMS HAVE BEEN DEVELOPED OVER THE YEARS TO ASSIST THE PRODUCER WHO IS A VICTIM OF ADVERSE WEATHER. NONE HAVE EVER BEEN DEVISED WHICH WILL REPLACE THE PRODUCTS WHICH WERE LOST, AND NONE CAN ADEQUATELY COMPENSATE A PRODUCER WHO WATCHES THE YEAR'S INVESTMENT IN TIME AND MONEY AND PRIDE GO DOWN THE DRAIN.

WE ARE CONVINCED THAT THE SOCIAL COST OF PROVISION OF AGRICULTURAL WEATHER SERVICES THROUGH GENERAL TAXATION IS SO MINOR IN TERMS OF THE

SOCIAL BENEFIT AS TO BE ALMOST INFINTESIMAL.

THESE SERVICES IN FLORIDA CARRY A SOCIAL COST LESS THAN ONE-1,000 OF THE ANNUAL VALUE OF FARM PRODUCTS SOLD AT THE PRODUCER LEVEL.

FEDERAL SPENDING FOR A PUBLIC WORKS PROJECT USUALLY CAN BE JUSTIFIED IF THE BENEFIT EXCEEDS THE COST BY ONLY A SLIGHT MARGIN. IN THIS CASE, THE BENEFITS SO FAR EXCEED THE COST THAT IT IS INCALCULABLE.

FLORIDA EXPERIENCED MAJOR FREEZES IN JANUARY 1981 AND 1982, AND THE FROST WARNINGS ISSUED BY OUR WEATHER STATION IN RUSKIN WERE A MAJOR FACTOR IN MINIMIZING LOSSES TO THE COLD WEATHER. BY USING THE INFORMATION FROM THIS WEATHER STATION, OUR GROWERS WERE ABLE TO TAKE FREEZE PREVENTION ACTION IN WAYS WHICH CONSERVED ENERGY AND THEREFORE HELD DOWN THEIR COSTS.

VEGETABLE GROWERS WITH ADEQUATE WARNING OF AN ONCOMING FREEZE WERE ABLE TO SPEED UP THE HARVEST OF CROPS WHICH WOULD OTHERWISE HAVE BEEN LOST IN THE COLD WEATHER, WHICH CONSERVED FOR CONSUMERS THOSE PRODUCTS WHICH WOULD NOT HAVE BEEN AVAILABLE ON THE MARKETS.

ON A MUCH BROADER SCALE, IT HAS BEEN POINTED OUT MANY TIMES THAT WEATHER INFORMATION IS VITAL TO FARMERS WHO ARE FORCED TO USE CHEMICALS TO PROTECT OUR FOOD SUPPLY AGAINST DISEASES, PESTS AND INTENSE COMPETITION FOR PLANT NUTRITION FROM WEEDS AND GRASSES.

MANY OF THESE CHEMICALS ARE WORTHLESS UNLESS THEY ARE ACTIVATED BY RAINFALL. KNOWING WHEN TO APPLY THEM IS THE KEY.

MANY FARMERS HERE IN FLORIDA AND INDEED THROUGHOUT THE UNITED STATES ARE SUFFERING FROM A COMBINATION OF HIGH COSTS AND LOW RETURNS WHICH HAVE SQUEEZED PROFITS TO THE POINT THAT MANY ARE GOING OUT OF BUSINESS. SUPPORT FOR WEATHER SERVICES FOR AGRICULTURE FROM GENERAL FUNDS OF THE UNITED STATES IS NECESSARY TO PREVENT THE FURTHER DECLINE OF AGRICULTURE IN THIS COUNTRY.

BASIC ECONOMICS SUGGEST THAT OF THE TWO WAYS WE HAVE TO HELP FARMERS BREAK EVEN OR MAKE A SMALL PROFIT WOULD BE TO: (1) KEEP COSTS AT A MINIMUM; AND (2) ALLOW THEM A HIGHER PRICE FOR THEIR PRODUCT.

COMMON SENSE TELLS ME THAT IT WOULD BE MUCH LESS EXPENSIVE FOR OUR SOCIETY TO STRIVE TO HELP FARMERS KEEP THEIR COSTS DOWN BECAUSE THIS WILL KEEP DOWN THE COST TO THE CONSUMERS OF THEIR PRODUCTS. THERE IS NO WAY A HIGHER PRICE CAN BE GRANTED TO FARMERS FOR THEIR PRODUCTS UNLESS WE IMPOSE RIGID MARKET CONTROLS WHICH ARE MOST OBJECTIONABLE IN A FREE SOCIETY. THE SENSIBLE ALTERNATIVE IS TO HELP REDUCE PRODUCER COSTS.

IT HAS BEEN SUGGESTED THAT FARMERS ARE THE CHIEF BENEFICIARIES OF AGRICULTURAL WEATHER INFORMATION AND THEREFORE SHOULD BE PAYING FOR THEM ON SOME KIND OF A USER FEE BASIS. THIS VIEW DOES NOT REFLECT REALITY.

ALL CONSUMERS OF AGRICULTURAL PRODUCTS ALSO ARE CONSUMERS OF WEATHER INFORMATION AND AGRICULTURAL WEATHER CAN NOT BE SEGREGATED OFF FROM GENERAL WEATHER INFORMATION. THEREFORE ALL SHOULD SHARE THE COST.

FURTHER, IT IS OUR CONTENTION THAT IF A USER FEE SHOULD BE ADOPTED, THERE IS NO ECONOMIC FORMULA IN EXISTENCE TO EQUITABLY ALLOCATE THE COSTS. ULTIMATELY, IT IS THE CONSUMER WHO PAYS ALL COSTS IN ALL CASES. HE PAYS EITHER THROUGH TAXATION AS AT PRESENT OR IN HIGHER PRICES FOR FOOD UNDER ANY ALTERNATE SYSTEM OF COSTING OUT THE WEATHER SERVICE. SHARING THE COSTS EQUITABLY THROUGH TAXES IS THE LEAST TROUBLESOME AND MOST EASILY COLLECTABLE METHOD OF FUNDING THE WEATHER SERVICE.

IT HAS BEEN SUGGESTED THAT AGRICULTURE RECEIVES SPECIAL CONSIDERATION FROM OUR SOCIETY THROUGH THE AGRICULTURAL WEATHER SERVICE SYSTEM. IN TERMS OF GOVERNMENT PROGRAMS, THIS BENEFIT IS INFINITELY LESS IN COST THAN SOME OTHER FEDERAL PROGRAMS WHICH CONGRESS HAS DETERMINED ARE IN THE NATIONAL INTEREST.

FEDERAL PROGRAMS FOR FARMERS IN FLORIDA IN 1981 COST JUST SHORT OF $11 MILLION. THE 1982 FIGURES HAVE NOT BEEN RELEASED YET. THE MAJORITY OF THESE COSTS WERE FOR CONSERVATION PROGRAMS AND GRAIN SUPPORT PRICES. THE CITRUS AND VEGETABLE INDUSTRIES HAVE NO FEDERAL SUPPORT PROGRAM, NOR DO THEY WISH TO HAVE ONE. THEY WOULD RATHER SEE CONTINUED SUPPORT FOR THE NATIONAL WEATHER SERVICE AND AGRICULTURALLY ORIENTED ADVISORIES AS AT PRESENT, I AM SURE.

WHAT OF THE FUTURE? THE UNIVERSITY OF FLORIDA RECENTLY COMPLETED A STUDY OF FLORIDA AGRICULTURE IN THE 80s AND ONE CONCLUSION WAS THAT WE WILL HAVE A DUAL SYSTEM OF AGRICULTURE. THE NUMBER OF SMALL FARMS CAN BE EXPECTED TO INCREASE WHILE THERE WILL BE NO NUMERICAL REDUCTION IN THE NUMBER OF LARGE AND MEDIUM SIZE FARMERS.

HOWEVER, THE SMALLER FARMS HAVE BEEN SHOWN TO ADD VERY LITTLE TO TOTAL FOOD AND FIBER PRODUCTION, BEING MAINLY RURAL RESIDENCE TYPES OF OPERATIONS SUPPORTED BY NON-FARM JOBS IN CITIES.

THESE FARMERS WILL HAVE NO RESOURCES TO SPARE TO PAY FOR AGRICULTURAL WEATHER DATA AND THUS WOULD BE MORE LIKELY TO SUFFER LOSSES OF WHAT LITTLE PRODUCTION THEY MIGHT HAVE HAD.

THE LARGER PRODUCERS WHO ARE WELL FINANCED WILL HAVE THE OPTION OF CONTINUING TO RECEIVE WEATHER INFORMATION FROM PRIVATE WEATHER INFORMATION PURVEYORS AS THEY IN FACT DO NOW.

I AM AWARE THAT CONSIDERABLE STUDY HAS BEEN GIVEN TO THE WEATHER SERVICES BY PRESTIGIOUS COMMISSIONS AND STUDY GROUPS. THERE ARE PROPOSALS FOR INCREASING NATIONAL INVESTMENT IN IMPROVING THE SYSTEM, AND THERE ARE PROPOSALS FOR SELLING OFF PARTS OF THE SYSTEM TO REDUCE FEDERAL DIRECT COSTS. I SUBMIT THAT DECISIONS IN MOST OF THESE AREAS OF CONCERN WILL REQUIRE MANY YEARS TO REACH.

MEANWHILE, WE DO NOT NEED TO DEBATE THE DESIRABILITY FOR CONTINUING THE MINIMAL SERVICE NOW PROVIDED OUR FARMERS BY THE WEATHER STATION AT RUSKIN. THAT POINT WAS SETTLED MANY YEARS AGO.

WE MOST URGENTLY RECOMMEND THAT IN REAUTHORIZING THE BUDGET FOR THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION THAT THE CONGRESS REQUIRE NOAA TO CONTINUE THE PRESENT LEVEL OF WEATHER CAPABILITY AND MANPOWER FOR THE DURATION OF THE AUTHORIZATION.

WE FURTHER URGE THAT CONGRESS ENCOURAGE THE NATIONAL WEATHER SERVICE TO COOPERATE WITH THE NATIONAL AERONAUTICAL AND SPACE ADMINISTRATION AND OTHER AGENCIES SUCH AS THE UNIVERSITY OF FLORIDA (IFAS) TO CONTINUE THE DEVELOPMENT OF ENHANCED FROST WARNING CAPABILITY AND WEATHER INFORMATION DISSEMINATION THROUGH ALL POSSIBLE CHANNELS FOR THE BENEFIT OF AGRICULTURE IN FLORIDA.

Mr. **Lewis**. Thank you, Mr. Stiles. We will have some questions for you. We are going to try to keep our hearing as informal as possible.

If the agricultural services are no longer funded by the Federal Government, could the State of Florida provide financial and technical support for the services that are used by Florida farmers today?

Mr. **Stiles**. I would find that very difficult to do today through our regular programs that we have. If it was funded, it would have to be through a joint program of some type similar to our, say, Market News information or Crop and Livestock information which would create an agreement of some type with a Federal agency to do that.

Mr. **Lewis**. Do you think that private industry could provide agricultural weather services for the Florida farmers?

Mr. **Stiles**. Well, most private industries will want to, but the only thing I want in the marketplace is to have my own advantage, and if I can get my information, whatever it might be, I keep it to myself and I don't provide it for other people, and I think that would be the case here.

Mr. **Lewis**. Assuming private industry did provide the services do you have an idea what the costs would be to the farmer, particularly the small farmer?

Mr. **Stiles**. No, I don't; but I am sure it would be prohibitive from the time that the small farmer would evaluate it and to place that where he is using Market News, as an example. The Federal Market News program has already changed and most of those are being charged from $40 to $80 to $100 a season. Most of your small farmers probably would not pay that amount of money if it could be done for that same amount.

Mr. **Lewis**. Do you have any idea how many Florida farmers currently use the agricultural weather services?

Mr. **Stiles**. No, I don't.

Mr. **Lewis**. One criticism of the agricultural weather services is that it benefits only a single industry. What benefits, either directly or indirectly, do nonfarmers receive from the agricultural weather services?

Mr. STILES. Well, actually this gets back, as I mentioned a while ago, in relation to the consumer. The consumer is the ultimate one that is going to pay for this service. And the big item here would be the cost to the consumer. During a freeze, we noticed it in 1981 and 1982, although it cut the volume way down drastically, the price went up the same way to the consumer at that same time.

Now, if the farmer can have the advantages of weather in formation, which they did have, but at the freeze level one degree could have made an awful lot of difference to the consumer. I see the consumer paying the big end here, and if we can save that and produce the crop at a more economical price, then the consumer in the long run is going to pay less money for the products in the marketplace.

Mr. LEWIS. I am sure you can give the committee some information on this. Nationally, farmers are in a situation of serious economic difficulty.

What is the general economic status of farmers in Florida? Do you think weather stations with this fruit frost warning system directly affect that economic status?

Mr. STILES. Well, right now the only benchmark we have to go by is the loans that are made through to the Farmers Home Administration, and over the United States last year there were about 25, I think 25 percent was the figure, foreclosures in Florida that was 51 percent, so I think that gives you an idea of the critical sitution that our farmer is in at this time.

Mr. LEWIS. Thank you, Mr. Stiles.

The gentleman from New York, Mr. Scheuer.

Mr. SCHEUER. Thank you very much, Mr. Chairman.

On the cost of the agricultural service and the benefits to consumers of the Agricultural Weather Service, is it not true that if all farmers receive weather information that will enable them to move swiftly to avoid the full impact of adverse weather changes, be it frost, be it flood, whatever it may be, so that they can plant at the right time, harvest at the right time, and so forth, will that not ultimately rebound in a better agricultural product at cheaper prices for consumers?

Mr. STILES. That is true, OK. It would provide the consumer with a cheaper product, with better quality, but if the farmer did not know that a storm was coming and did not harvest ahead of time, then it would be left in the field, a total loss, and the consumer would have to pay much more for the product.

Mr. SCHEUER. Is there any way that you could give us some kind of cost/benefit factor; let's just say for the State of Flordia, to make it a little bit simpler, how much does the weather service cost? Well, we know that we could prorate the $1.4 million to your State, probably allocate a portion of that so we know what the costs would be.

The question would then be, how do we figure the benefits to the farmers, and even more important to consumers, of farmers having that product? Is there any way that you can help us quantify that on an annual basis?

Mr. STILES. We could give you the breakdown on our various products. In other words, vegetables is around $800 million on an annual basis. Citrus is over $1 billion on an annual basis. Now we could give you a breakdown of each one of those by varieties on citrus, by product on vegetables, and then, of course, you could take that and plug it into the cost factor.

Mr. SCHEUER. What I am asking is how much in citrus and vegetables have farmers been able to serve by having the availability of that weather service? And I take it from your answer to my prior question that most of those savings rebound to the benefit of the consumers in lower prices.

Mr. STILES. Right.

Mr. SCHEUER. If all farmers have the benefit of the weather service, they all affect the economy because of that and avoid spoiled crops and all of that, that saving in effect gets passed on to the consumer in the form of perhaps a better product at a lower price.

Is there any way that you can give us the total savings that consumers enjoyed in your State as a result of famers having that weather service and as a result of their being able to avoid the worst effects of the frost, the drought, the flood, whatever?

Mr. STILES. We keep records on our out-shipments, particularly on all of our vegetables. We maintain a 3-year average, for prices? Movement on a weekly basis, and we maintain last year's average price and movement and a current record of what the price and movement is up to date today.

We could go back, as we made reference to previously, we could go back and we could recalculate that for you and show you what is taking place and probably, again, it was not a total freeze, although the 1981 and 1982 freeze was just about as severe as you could get, we still had some movement, a lot of that would be credited to probably weather information. We could make that available to the committee.

Mr. SCHEUER. That would be very helpful.

Mr. Chairman, I would ask unanimous consent that the record be held open for perhaps a week or 10 days. Would that be sufficient time?

Mr. STILES. Yes, I will be glad to do that.

Mr. SCHEUER. In order to get this very helpful information for the record.

Mr. LEWIS. Hearing no objection, so ordered.

[The information follows:]

STATE OF FLORIDA

FLORIDA DEPARTMENT OF AGRICULTURE & CONSUMER SERVICES

DOYLE CONNER COMMISSIONER * MAYO BUILDING TALLAHASSEE 32301

RECEIVED
APR 15 1
TOM LEWIS, M.C.

April 11, 1983

Honorable Tom Lewis
Congressman, District 12
1313 Longworth House Office Building
Washington, D.C. 20515

Dear Congressman Lewis:

It was a real pleasure for me to stand in for Commissioner Doyle Conner at the Subcommittee On Natural Resources, Agriculture Research and Environment hearing on agricultural weather services in West Palm Beach on March 31, 1983.

In response to questions from the Subcommittee, I am pleased to submit additional information on the value of the Ruskin weather station's agricultural service system to Florida agriculture. The report is limited due to the lack of time for an indepth study of all factors that would be necessary to give a complete analysis.

I was also requested to give a breakdown of government payments to Florida for 1981, and they are as follows:

Conservation Programs	$ 3,635,000
Feed Grain (support)	3,118,000
Wheat (support)	233,000
Cotton	20,000
Rice	-0-
Drought & Flood	-0-
Miscellaneous*	3,986,000
Total	$10,992,000

*Includes payments under Sugar Act, National Wool Act, Milk indemnity Program, Beekeepers Indemnity Program, Cropland Adjustment Program, Hay and Cattle Transportation Program, Forest Incentive Program, Water Bank Program, Emergency Livestock Feed Program, Great Plains Conservation Act Program, and other miscellaneous programs.

The Subcommittee may be interested in knowing that federal payments to Florida farmers in 1980 were $7,063,000, and the previous year (1979) were $5,777,000, with most conservation payments.

If we can be of additional assistance to the Subcommittee in any way, please advise.

With kind regards, I am

Sincerely,

John D. Stiles

John D. Stiles, Director
Division of Marketing
904/488-7970

Mr. SCHEUER. Thank you very much, Mr. Chairman.

Thank you, Mr. Stiles.

Mr. LEWIS. The gentleman from New York, Mr. McGrath.

Mr. MCGRATH. Thank you, Mr. Chairman.

Mr. Stiles, much has been said, and you made a great point regarding the benefit to the consumer.

Mr. Scheuer and I, coming from New York and having a large number of consumers, we are interested in the price to the consumer, and certainly there seems on face value to be a large cost/benefit to the consumers by having this $1 million for the agricultural weather services and only $418,000 for the fruit frost warning system. Is that $1.4 million part of the $11 million that you said in your testimony was a Federal support program for Florida farmers?

Mr. STILES. No.

Mr. SCHEUER. In 1981?

Mr STILES. No, I am talking about, the $8 million that I used was a figure, that's the cash receipts which is the $4 billion.

Mr. SCHEUER. You said on page 5 that Federal programs of farmers in Florida in 1981 cost just short of $11 million.

Mr. STILES. That is the subsidy programs that they receive for grain and conservation programs.

Mr. SCHEUER. And you also said that the majority, let's see, the citrus and vegetable industries have no support program.

Mr. STILES. That is true.

Mr. SCHEUER. OK. How much does the State of Florida contribute towards the support of its agricultural industries in the forms of support programs or other types of informational programs, whatever?

Mr. STILES. That would be—by the way, the New York market is our No. 1 market, and we have a fulltime person there, and we make a trip to New York every year with Commissioner Conner and the Harvest Festival and meet with the buyers up there. We appreciate the good work that New York does for us.

I lost your question.

Mr. SCHEUER. The question was, vis-a-vis the Federal support of $11 million, what is the contribution of the State of Florida in terms of other types of programs, maybe, or whatever?

Mr. STILES. This would take quite some time to figure all these support programs out. In other words, in our divisions of marketing we have two programs that are federally, State-sponsored at the present time. One of those is Market News, of which half the money is paid by Federal and half is paid by State.

The other is the Crop and Livestock Reporting Service, but the moneys here are paid by Federal and the other is paid by the citrus industry by the money that they assess for boxes of citrus that they pay for. And, of course, in our inspection programs, and that's in our other divisions, I have no figures on that total.

Mr. MCGRATH. We will leave the record open for that kind of question.

One other question. Is there any contribution by agricultural growers in Florida toward any information or any support system?

Mr. STILES. Yes, the citrus industry is doing that at the present time through their marketing order program.

Mr. **McGrath**. Thank you.

Mr. **Stiles**. Which produces market information.

Mr. **McGrath**. Thank you, Mr. Chairman.

Mr. **Lewis**. Yes. Mr. Stiles, it has been estimated that the agricultural weather services save 10 percent of the crops. Would you consider that an accurate statement?

Mr. **Stiles**. I would need to look at those figures again, the ones particularly on vegetables and citrus too, and we can reflect that. I think we'll try to come up with a figure on that for you.

Mr. **Lewis**. All right. Will you give me an accurate statement saying that if this is true that this would mean a saving of more than tens of millions of dollars?

Mr. **Stiles**. Yes, it would, because, you see, we are talking about better than $2 billion on the total crop, so if you could save 10 percent of it, yes, this would be extremely high.

Mr. **Lewis**. Thank you very much, Mr. Stiles.

Are there any further questions from the committee members? Thank you, Mr. Stiles. We appreciate your appearing before the committee.

Our next witness is Mr. Clayton Hutcheson.

Mr. Hutcheson, would you come to the table, please and give us a 10-minute summary of your written testimony, the entire statement will be entered into the committee record.

STATEMENT OF CLAYTON E. HUTCHESON, COUNTY EXTENSION DIRECTOR, FLORIDA COOPERATIVE EXTENSION SERVICE

Mr. **Hutcheson**. Mr. Chairman, members of the subcommittee, I appreciate the opportunity to be here today.

My name is Clayton Hutcheson. I am the county extension director here in Plam Beach County.

Today I am representing the University of Florida and the Institute of Food and Agricultural Sciences and our relationship and some of the things that we do relating to the National Weather Service or the agricultural weather service.

I have submitted the written testimony relating to the value of the service to the agricultural industry, as I perceived it.

My purpose today is to try to demonstrate to you some of the methodology being developed at the University of Florida. We are disseminating some of the weather information to agricultural producers here in Florida.

One of the concerns, of course, that is directed in some of the questions that you asked to be answered, is the value of the agricultural weather service to farmers in Florida, and also the impact that it might have if it was taken over by private industry.

Mr. Stiles alluded to the fact and gave some figures relating to the farmers in Florida. Out of those 41,000 farmers that we have in Florida, about 15,000 of those farmers would be considered small farmers.

We call in that category that would probably not be able to access or to afford a service that I would envision coming from private industry; so that is somewhat the magnitude or the breakout of farmers, small farmers, and then those that might be in farming on a full-time basis.

Mr. McGRATH. Will the gentleman yield?

Mr. LEWIS. Mr. McGrath.

Mr. McGRATH. That brings up a good point. What do you envision? I guess there are private forecasters at the present time. What is the difference in the cost of the information that a small farmer would get from the fruit frost-warning system at the present time versus what it would cost from private industry?

Mr. HUTCHESON. I am not sure about those figures, but in my testimony I would like to just address one of the systems that is being developed and some of the costs related there by a not-for-profit organization that is coming along in Florida, and I would do that just a little bit further along, if I may.

Mr. McGRATH. Fine.

Mr. LEWIS. You may continue, Mr. Hutcheson.

Mr. HUTCHESON. What we have today here before you on the table is a system that is coming into being here in Florida and serving some of the industry at the present time, although on a limited basis.

Florida is unique, even here in south Florida, which I relate to as being extension director here in the county. We have a wide range of crops. We have over 410 different types of just ornamental crops in our very large ornamental horticultural industry here in south Florida. We have over 25 major vegetable crops right here in this particular county, so we are talking about a very large industry.

So the impact that weather has——

Mr. SCHEUER. Will the gentleman yield?

Mr. HUTCHESON. Yes, sir.

Mr. SCHEUER. Could you tell us what ornamental means?

Mr. HUTCHESON. Those are the foliage plants that we send to New York City and other places.

Mr. SCHEUER. Just flowers?

Mr. HUTCHESON. Yes, and landscape plants that we use more locally here than shipping those out, but we do send an awful lot to the Northeast market.

Mr. McGRATH. Mr. Hutcheson, you are just going to have to excuse us. You can dress us up, but you can't take us out.

Mr. HUTCHESON. I appreciate the opportunity to answer the questions.

In recent years, the University of Florida has had a unique opportunity to be involved in develoing some quite sophisticated techniques and instrumentation programs to disseminate weather information. The satellite frost forecast system that has developed over the last several years has started to play an important role in our industry. That has been done through the fruit crops department at the University of Florida.

The SFFS system takes information that comes down from the GOES satellite and is fed into the computer at the University of Florida, processed, and then made available on thermal maps of what is happening across the State.

The way that this has been done and the way it has been put into practice to make it applicable and useful to growers is on a 30-minute basis. Information comes down from the satellite, the thermal map is put together by the computer and broken down into increments of temperatures that can be seen across the State of Florida, and a grower on a 30-minute basis can see what the actual temperature is as the feeeze moves down the State, how it is developing, how fast it is moving and the intensity of the temperatures involved.

So what we have there today and what I wanted to be able to do is show you a little bit on how that actually happens.

What we have done to this point in Florida, through about 10 extension offices in the State and one in south Georgia, is feed this information through a microcomputer to those offices, and then the offices from there, the extension offices, have tried to deliver that information, either thorugh a microcomputer at the farmer's farm to him or through another system, maybe taking the information from the extension office, synthesizing that, putting it on some code-a-phones and then having growers call in and gather that information straight from the extension office.

The thing that has been good about it is that it has been very directly related to agriculture. It is interpreted as far as agricultural crops in that specific area, and that is where it has meaning for the growers in Florida.

One of the things, other than what is shown here on the screen, we also are able to produce a symbol map that is in black and white of the State of Florida, and the symbols on there are indicative of the temperatures for those specific areas and what you can do on the day following a freeze.

As far as the research needs in looking to the future and the needs in particular to develop this system further, what we need in particular is a good deal more software developed to utilize the information that actually comes from the computer, from the satellite.

There is also the element of being able to predict what the temperature is going to be maybe 8 hours from now by taking and looking back at past maps and then comparing what is presently happening to what might happen say tomorrow morning if a freeze was approaching.

What we have here in this particular microcomputer and on this particular monitor is a sequencer, and what it does, it's just taking you through about 10 or 12 maps, I guess, on a half-hour basis for a period of January 15 and 16.

What the computer did, it just stored those and we put them on there and so it is just showing, as the cold, as the temperatures change across the State, what it would look like every 30 minutes to a grower. He can pick out his particular area; he can see what the temperatures are there; he can see what the change is coming down the State.

This particular monitor over here, what we have done, the satellite is beaming down information. It is put together every 30 minutes, and we have—I am not sure what map—the 10:30 map on there, the State of Florida right today, and that shows probably some cloud cover still in south Florida and it shows the clearing, the temperatures, the actual thermal temperatures for the northern portion of the State.

This can break it out into whatever increments, about down to one or two degrees difference, and so that is the type of information that we anticipate growers getting in the future.

One thing that is happening here in Florida, there is a not-for-profit corporation being put together by a group of agriculturalists here in Florida. It's called FAST [Florida Agricultural Science and Technology]. That particular corporation is being put together and they will be using a very large computer up in Alachua, north of the University of Florida there.

They will be selling subscriptions, memberships to that system, and for maybe $50 a month they are anticipating at this point in time the grower with a microcomputer and a monitor like this can receive the weather information.

There is a variety of types of weather information they are going to be putting on there, specifically rainfall, and these types of things that will be read on a 30-minute basis and be made available to subscribers to that particular system.

The other thing, of course, that they will be developing that whole computer system for agriculturalists, will also be economic information and typical information that a person might also get from an extension office as we serve people today in Florida. But that is a not-for-profit corporation. That is about the cost that they are projecting at this point in time.

They are looking at about $1½ million to run that system each year, and they are willing to take donations or memberships at this point. The main frame computer is going to be delivered supposedly in the month of April. They would anticipate having that system on maybe in September or October for subscribers to use, so that is one way that an organization is going to be disseminating some type of weather service or weather information to growers here in the State of Florida.

The University of Florida will be hooking in and feeding information to that particular system on other topics relating to agriculture, so that just gives you some idea of where we are as far as some of the technology with microcomputers. We have had a number of seminars across the State of Florida recently, the Institute of Food and Agricultural Sciences.

Growers are very interested in the utilization of microcomputers on their farms, but again we are talking about not every grower in Florida, probably. The small grower is going to take some convincing that this can maybe do him any good and maybe it will be a time before it can actually benefit the small grower.

That's about where we stand today in Florida, as far as this particular type of technology and the impact it might have on Florida's agriculture in the future.

[The prepared statement of Mr. Hutcheson follows:]

TESTIMONY BEFORE THE U.S. HOUSE SUBCOMMITTEE

ON

NATURAL RESOURCES, AGRICULTURAL RESEARCH AND ENVIRONMENT

Presented By:

Clayton E. Hutcheson
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Phone: 305/683-1777

March 31, 1983
Palm Beach County Commission Chambers
West Palm Beach, FL

The Agricultural Weather Service has been very important to Florida's farmers for many years and continues to be so. The unique status of Florida's crops, their sensitivity to cold, the acreages and types of crops grown in the winter, all add up to a situation very dependent on accurate weather information. The unpredictability of the weather has always been a major problem for farmers. Nowhere in the United States are farmers more vulnerable to the adversity of cold weather than in Florida.

In South Florida alone, there are in excess of 410 types of nursery plants grown for the commercial market. Around 95 percent of these are subject to damage by moderate to severe cold or freezing weather.

There are more than 25 major vegetable crops grown here that are also very cold sensitive. To carry out any type of crop protection program, growers must have weather information ahead of time and with a great degree of accuracy.

VALUE OF THE AGRICULTURAL WEATHER SERVICE TO LARGE AND SMALL GROWERS

The Cooperative Extension Service, as it has interfaced with the farming community over the years, can speak to the value of the Agricultural Weather Service to both large and small growers.

With large growers, the magnitude of their problems seems much greater due to the large dollar amounts invested. It is not unusual for growers to have $4,000 per acre invested in a crop of tomatoes. This rapidly translates into millions of dollars.

Timely and accurate weather information is necessary for the farmer to decide on which of the cold protection options he has available to use based on the value of the crop. The option chosen may depend on several pieces of information available to the farmer. Information on how cold it is predicted to be, the cost per hour per acre to provide protection, the value of the crop presently in the field and how many more times it can be harvested are just some of the informational items he must have at hand to make decisions. All his decisions are predicated on accurate weather information as it relates to his area of the state and more important, to his farm.

The same type of decision must be made by the small farmer. While the dollars involved may not be as large, the decision may be more critical. A small farmer may not have the resources to continue farming if hit by a major disaster such as a freeze without proper crop protection.

For any grower, the proper management of his crop, through a crop protection program, may mean a saved crop and possibly saved money through less energy expended. This can also result in reduced cost for food to the consumer.

There is no way to exactly determine the value of the service to large and small growers in Florida. It can be said that the crops grown in South Florida below Lake Okeechobee in the winter are valued at around 1.5 billion dollars at the farm gate. On any given freeze night, if accurate weather information could save ten percent of these crops, the value would be 150 million dollars. The state's citrus crop in danger of freeze damage could be valued at 500 million dollars on any given winter day.

COST SAVINGS FOR GROWERS FROM INFORMATION GAINED FROM AGRICULTURAL WEATHER SERVICE

Costs saved fall into two categories: (1) the fuel/labor costs saved from not having to do certain things relating to cold protection and; (2) costs saved by carrying out certain cold protection practices thereby saving the crop and all the costs that might be related to replanting the crop.

Many cold protection practices have a direct relationship to energy costs. Pumping to raise water levels in ditches, to provide overhead sprinkling, to run low volume irrigation systems and to burn heaters, result in large fuel expenditures. As far as can be determined, no one has very exact figures for Florida agriculture relating to this or the necessary labor to perform the tasks.

It can be assuredly said that with each freeze, millions of dollars are expended. With accurate weather information, growers can save money with proper planning. This might possibly mean the difference between profits and losses in any given year.

AGRICULTURAL WEATHER DATA VIA SATELLITE AND COMPUTER

In recent years, the University of Florida has had the opportunity to be in the forefront in the development and distribution of special technology that is providing agricultural producers with weather data in a special format.

The Satellite Frost Forecast System (SFFS) has been developed by the Climatology Laboratory of the Fruit Crops Department of the Institute of Food and Agricultural Sciences (IFAS) of the University of Florida with support from the National Aeronautics and Space Administration (NASA). SFFS acquires satellite sensed temperatures from the eastern Geostationary Operational Environmental Satellite (GOES) operated by the National Earth Satellite Service, National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce. Instructions within a NASA supplied minicomputer, the heart of SFFS, partition the temperature data into color bands and cause the resulting map to be displayed on a color TV screen within minutes of the reception of the satellite data.

SFFS not only acquires temperatures from GOES to display thermal maps in color but also schedules programs which predict future temperatures during the frost night. A sister minicomputer in Ruskin interrogates via telephone ten automated weather stations over the peninsula of Florida to acquire air temperature, soil temperature, wind speed and net radiation. This date is used by a model that solves the surface energy budget equation at each site. The model predicts the temperature fall at each of the ten sites for the remainder of the night. A second model takes predicted temperatures from the first model and fabricates thermal maps for each night by recalling the tempearture patterns from past frosts and freezes. Prediction maps have the same configuration as the observed maps and the system can display the two maps side by side. It can subtract one map from the other and display temperature differences as a third map. This latter process provides an excellent test of the predictability of the models as the forecasts are verified.

Dissemination of SFFS products currently occurs through an experimental network to eight Florida County Extension Offices and one in southern Georgia. Efforts are underway to use the IFAS Computer Network to provide dissemination ports for the system. This will icnrease the number of ports that IFAS personnel may call with APPLE II and III microcomputers to acquire SFFS products. An experiment took place in Lake and Orange Counties in which ten growers received satellite views by calling an APPLE II in the Extension Center in Tavares. One commercial television station is periodically acquiring the products on an experimental basis and several stations have been following the development with interest.

Several products have been disseminated that do not require display by the microcomputer and color TV. One is a black-and-white printout of satellite map data. The map uses symbols which can be equated back to temperature through a translation table incorporated in the printout. These records of the freeze are used in assessment of frost damage and in modifying harvesting decisions. Such products are easily and repidly copied for distribution. Recently, a link with AFOS, the computer-controlled communication network used by NOAA/NWS to handle weather information, has been developed to pass the frost warning bulletins developed by the NWS forecast office in Ruskin to the SFFS network.

The limitations on the usefulness of this valuable data has been the lack of an effective distribution system. To receive maximum benefit, all growers in Florida should have equal access to this information.

SPECIALIZED WEATHER SERVICES VIA PRIVATE INDUSTRY

The amount of weather information available is quite abundant, but the processing and delivery of the information in a format suitable for widespread agricultural use is quite limited.

In Florida, the delivery of this information may have to be by private industry. The cost would be large and would have to be paid for by the agricultural user. The cost might well limit the availability of such information to the 16,000 farms in Florida with sales of less than $2,500 per year. Many of the remaining 28,000 farms with incomes above this might well be able to afford the expense.

The Satellite Frost Forecast System has served as a forerunner to Florida Agricultural Science and Technology (FAST), a not-for-profit corporation that proposes to disseminate products like those demonstrated by SFFS but covering the broad area of agricultural weather and climate information. SFFS is serving as an experimental tool in feasibility studies related to acquisition of radar and AFOS data, in anticipation of products that describe precipitation, evapotranspiration and severe weather patterns in much the same way SFFS displays frost hazards. Agriculturists in Florida should have opportunities to display highly tailored weather and climate products on color TV monitors driven by microcomputers interrogating data bases such as the IFAS computer network and FAST. Such rapidly communicated products are likely to aid agriculturists and resource managers, in general, to more efficiently and effectively utilize the most valuable resource in Florida, it's climate.

FAST is expected to gradually assume much of the operational responsibilities that the SFFS development system has accumulated and, in the process, accrue support for its services from the members it serves. In addition to the satellite color coded thermal maps developed for the frost situations in Florida, FAST is likely to develop color renditions of radar summaries, composites of overlays of radar and satellite cloud top temperatures, lightning maps and their composite with the rainfall maps. Two Control Data Corporation software packages are expected to aid the development of these products, i.e. CDC/McIDAS and INTERSYS.

The characteristics of the system are primarily apparent to the end user as they are displayed on the system terminal. The new Zenith Z-100 dual-processor microcomputer is being programmed by members of the SFFS development team toward testing its ability to serve as one of many microcomputer systems with which the FAST system expects to be compatible. Sufficient development has occurred in this software that this microcomputer, along with the more typical SFFS APPLE II Plus, has been demonstrated around Florida over the last two months.

Of the many concepts that have developed from experiences with the SFFS operation that is being passed to the FAST system is the intention to serve members as uniquely as possible with products tailored to their specific needs. During initial contacts with FAST members and, subsequently when they are linked to the system, efforts are to be made to accumulate and store information in the system which ~~will~~ facilitate its reacting to their requests uniquely when their particular site or the manner in which they have indicated they intend to use the information warrants special processing of their products.

FUTURE RESEARCH NEEDS

The progress made in Florida relative to accumulation and dissemination of agricultural weather information is laudable but much more must be done. Without further research and development, the agricultural industry cannot fully capitalize on the development to date.

While the presentation and dissemination of the real time satellite map is well on the way to being operational, the formation of the predicted product has lagged behind. Two predictative models, fed by satellite data and data from ten automated weather stations scattered over the Florida peninsula, forecast what the satellite is expected to see several hours in advance. The user can request of SFFS a color thermal map for eight hours or so in the future when sitting in front of a microcomputer terminal and color TV monitor or for any particular hour between.

If funds were available, it is possible that additional software could be produced to instruct the computer to scan these predicted maps and disclose to the user when the temperature will reach the critical point in his area and display that particular map so that he can see how the rest of the area will be doing at that time. There is a grave need to continue to refine and develop additional software for SFFS.

The University of Florida Institute of Food and Agricultural Sciences owns the SFFS development system, i.e. the minicomputer based system in the Climotology Lab in the Fruit Crops Department of IFAS in Gainesville. This system is now part of the operational system in that it downlinks the satellite (GOES-FAST) through an antenna system at the University of Florida. As mentioned previously, the development system also has handled all the dissemination of SFFS products (beyond the forecasters in Ruskin). It did this under an experimental effort directly for a couple of years, i.e. 80-81 and 81-82, but has, this winter, experimented with the dissemination of products to IFAS units through the IFAS Computer Network, a DEC VAX based system. Some links exist with non-IFAS users (experimental) through the development system's ports, e.g. television stations, activity in other states under study, etc. The support that has come to this program through NASA Kennedy Space Center ends on the 31st of this month. Further funding is needed here to extend dissemination through other methods.

Another area needing research is the combining of satellite information with radar information to give more precise measurement of rainfall.

This information, when provided to agriculturists on essentially a real time basis, could result in dramatic savings in the use of pesticides, labor and energy. The planning and carrying out of daily farm operations based on surrounding weather movement as seen displayed on an on-farm computer monitor could be done in a more precise manner. Scheduling of pump operations for irrigation or drainage could result in significant savings if the grower could have better information on anticipated rainfall. Water management in Florida is critical to the entire population and resulting benefits would affect the entire state.

CONCLUSION

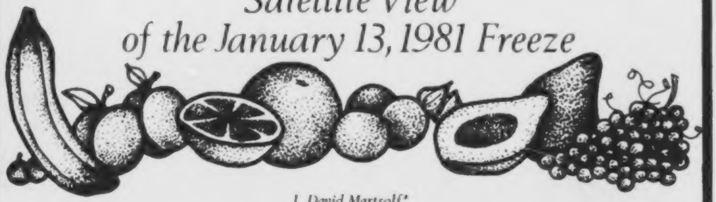
The unique and vital nature of Florida agriculture means it is irreplaceable. No other area in the United States can produce the variety and quality of crops found here. The industry has grown and prospered for a variety of reasons. An essential element in this growth has been timely and reliable weather information. Developments, through satellite and computer technology in the last few years, have provided a glimpse of what can be. It is essential that the agricultural weather service be maintained to provide the foundation upon which the future can build. The meshing of public research and development and private enterprise should provide a reliable weather information base and a delivery system to meet the needs of a sophisticated agricultural industry. While the grower will never be able to master the weather, he should be provided the needed informational resources to maximize his productivity. This would seem to be a promise of the very near future if resources are made available.

Fruit Crops Fact Sheet
Satellite View of the January 13,
1981 Freeze
FC-68

FC-68

Fruit Crops Fact Sheet

Satellite View of the January 13, 1981 Freeze



J. David Martsolf*

Florida Cooperative Extension Service / Institute of Food and Agricultural Sciences / University of Florida / John T. Woeste, Dean

Freezing temperatures occur in Florida infrequently. When they do, the consequences are widespread and severe. The freeze of January 13-14, 1981, is second only to the freeze of December, 1962, when compared to other freezes of this century.

It has become possible to document the temperature distribution over cloudless portions of the earth by satellite. This publication demonstrates such documentation for the Florida peninsula, using the output of GOES (Geostationary Operational Environmental Satellite) stationed about 22,000 miles above the Equator at 75°W.

The primary heat transfer mechanism in developing the freezing conditions in Florida is heat loss from a surface by radiation in the infrared portion of the spectrum, i.e. about 10 microns in wavelength. A satellite determines surface temperature by sampling these infrared rays as they leave the cooling surface toward cold outer space. So the combination of satellite thermal imagery and frost damage assessment is an attractive application of space age technology.

Figure 1 diagrams the channels through which the data depicted in this publication were acquired. For several years, NASA (National Space and Aeronautics Administration) has been funding IFAS/Climatology (the Climatology Laboratory of the Fruit Crops Department of the Institute of Food and Agricultural Sciences) in the development of SFFS (the Satellite Frost Forecast System)[1]. SSFS is primarily a system of two mini-computers, one residing at the NOAA/NWS (National Oceanic and Atmospheric Administration/National Weather Service) forecast office in Ruskin, Florida, and the other in the IFAS Climatology Lab in Gainesville, that have been programmed to acquire the satellite data, as well as to perform other functions necessary to providing both observed and predicted satellite views. The data used in this publication were acquired through the Gainesville portion of SFFS.

In the center spread of this publication (Fig. 2) is a computer printout of the symbols that constitute the data as they are received from the NOAA/NWS queue in Suitland, MD. A translation table has been overlaid just west of the peninsula to be used to translate particular symbols to the temperature they represent. The outline of the state, county borders, several lakes and a river have been drawn on the map by Dr. Ellen Chen, a post-doctorate assistant in Climatology.

The color print on the back page (Fig. 3) is a photograph of the display of the satellite data on the TV monitor of SFFS. The SFFS display program not only codes the pixels (symbols) according to the table displayed beside the peninsula, but also interpolates in both the N-S and E-W direction to bring the image into equivalent area scale. In the case of the symbols map (center spread), the N-S scale is stretched relative to the E-W. Each of the original pixels represents an area about 5 miles N-S and 4 miles E-W.

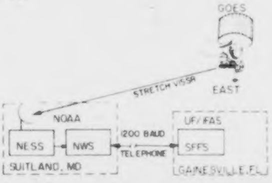


Fig. 1. Diagram of the communication paths over which the data depicted in Figures 2 and 3 were acquired. The stretched VISSR (Visible, Infrared, Spin-Scan Radiometer) data are retransmitted satellite data which have been slowed up in rate to be more easily received than the original data. The data arrive at an antenna at NOAA/NESS and are temporarily stored until they can be written onto the VDB (VISSR Data Base) by a batch-mode computer program. Another batchmode program initiated by NOAA/NWS selects the Florida sector of the infrared data from the VDB and stores it in a queue where SFFS may find it when SFFS calls for it over a voice-grade telephone link.

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*J. David Martsolf is a Professor and research specialist in climatology, Fruit Crops Department, IFAS, University of Florida, Gainesville.

[1] NASA Contacts: NASIO-9611 and 9892, acknowledged.

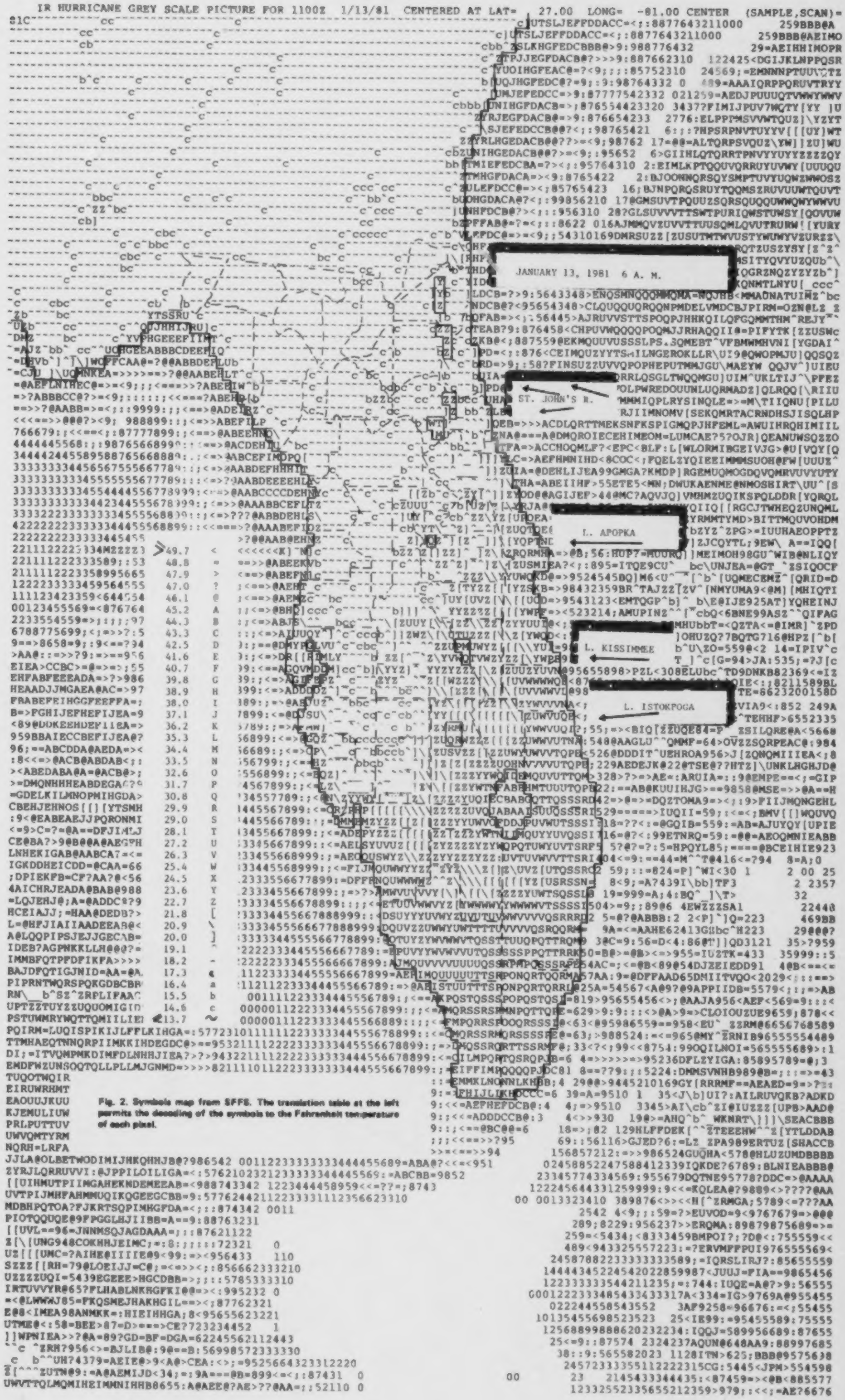

Fig. 2. Symbols map from SFFS. The translation table at the left permits the decoding of the symbols to the Fahrenheit temperature of each pixel.
]

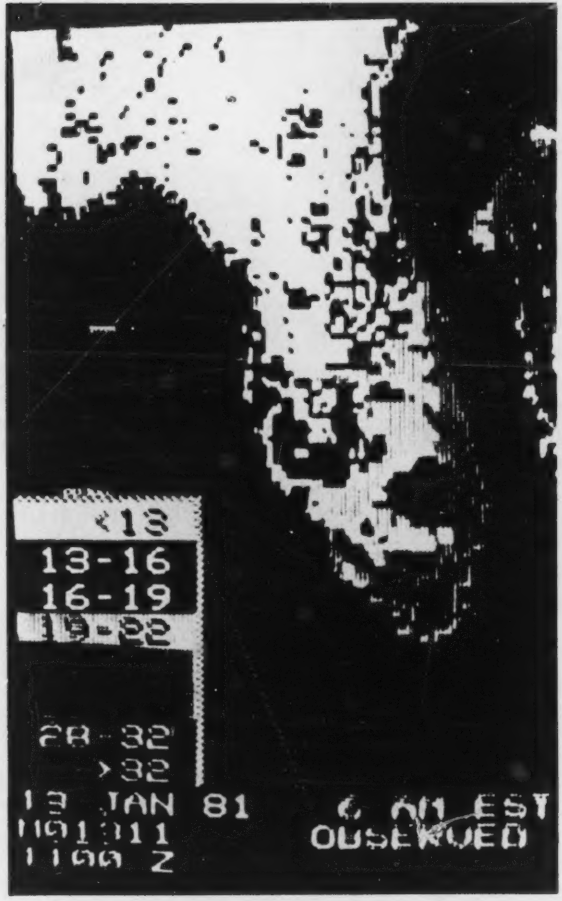

Fig. 3. A color photograph of the output screen of the Satellite Frost Forecast System in which the temperature distribution near dawn on January 13, 1981, is indicated. The colors can be translated to a temperature range by reference to the temperature ranges indicated on the photograph.

This publication was promulgated at a cost of $681.75, or 17 cents per copy, to inform Florida agriculturists and others with interests threatened by freezing weather about the development of the Satellite Freeze Forecast System. 11-4M-81.

COOPERATIVE EXTENSION SERVICE, UNIVERSITY OF FLORIDA, INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES, K. R. Tefertiller, director, in cooperation with the United States Department of Agriculture, publishes this information to further the purpose of the May 8 and June 30, 1914 Acts of Congress; and is authorized to provide research, educational information and other services only to individuals and institutions that function without regard to race, color, sex or national origin. Single copies of Extension publications (excluding 4-H and Youth publications) are available free to Florida residents from County Extension Offices. Information on bulk rates or copies for out-of-state purchasers is available from C. M. Hinton, Publications Distribution Center, IFAS Building 664, University of Florida, Gainesville, Florida 32611. Before publicizing this publication, editors should contact this address to determine availability.

Mr. LEWIS. Thank you, Mr. Hutcheson. Based on what you have said, how long do you think it would be until a computerized system such as this would be available to the majority of the farmers in Florida?

Mr. HUTCHESON. I would say the quickest way that it's going to happen would be with the FAST system, the not-for-profit corporation. The ability of say an extension office to collect this information and disseminate it to growers within the county is somewhat limited just because of the funds not being there to be able to do that.

Mr. LEWIS. Where do you receive your information for your pictorial displays. From NOAA?

Mr. HUTCHESON. It comes from the GOES satellite and it comes down through a dish at the University of Florida. It goes into a Hewlett Packard computer there and then we are calling that computer, yes.

Mr. LEWIS. Do you supplement any of this with information from Ruskin, Fla.?

Mr. HUTCHESON. Yes, I might say—and I didn't mean to overlook that—but all of this has been developed with the people at Ruskin. It would not have been able to be developed without the help and aid of that particular station.

Mr. Fred Crosby has been very instrumental as the director of that station in working with IFAS for a number of years hand in hand to develop this particular system. The University of Florida could not have done that by itself without the cooperation of the agricultural weather service.

Mr. LEWIS. You work on a daily basis with the farmers who utilize agricultural weather services. What do you feel the benefits of these sevices are to the farmers in Palm Beach, Hendry, and Martin Counties?

Mr. HUTCHESON. The primary benefit is whenever they are preparing, in most cases, to prepare a protection for their crops when a freeze is coming. It is very hard to put a dollar value on that, but it gives them the capability of looking several hours in advance, making decisions on whether they are going to pump water, to put warm water around their crops maybe to raise some temperatures, whether they are going to supplement with some sort of heat, say, in nursery crops.

They need to make those decisions on accurate weather information. Once you pump the water and once you make that decision, you have expended money, you have expended energy, and if that is not the proper thing to do, then you have cut your profits for that year just because you have expended money that was unnecessary.

So that in making those types of decisions that is where the farmer finds the agricultural weather service very valuable.

Mr. LEWIS. If the Ruskin station were closed or had its capability seriously reduced, how would that affect the program you are presenting to us today? How would it affect the Florida farmer?

Mr. HUTCHESON. It would remove a vital source of information and the information that the forecasters put together in supplementing the information that comes from the satellite, or wherever. While we have the capability of putting things like this together as far as the university in doing the research, the necessity of the forecaster to help in interpretation, in the matter of interpretation of the weather and making some of the predictions and projections, is a very vital part of the whole system, and it would take away a very important segment of the delivery system.

Mr. **Lewis**. Therefore, I could conclude by saying that there would be a significant impact on the Florida farmer if the Ruskin information services were discontinued.

Mr. **Hutcheson**. Yes, that is a necessary part of the system.

Mr. **Lewis**. Thank you.

The representative from New York, Mr. Scheuer.

Mr. **Scheuer**. No questions, Mr. Chairman.

Thank you.

Mr. **Lewis**. The gentleman from New York, Mr. McGrath.

Mr. **McGrath**. Thank you, Mr. Chairman.

The Geostationary Orbiting Environmental Satellite East, that is what gives you your pictures for South Florida or all of Florida?

Mr. **Hutcheson**. Correct.

Mr. **McGrath**. The GOES West has been down. Now is the GOES East functioning?

Mr. **Hutcheson**. As far as I know, it's doing well. That is all I can say at this point.

Mr. **McGrath**. Interesting, looking at the display here, around the bottom it says, "Copyright 1983, all rights reserved." How is FAST, the nonprofit, the frost forecast system, are they going to be taking their information from GOES East too? Am I correct?

Mr. **Hutcheson**. As I understand it, it would be an arrangement with the system, yes.

Mr. **McGrath**. Well, how are they going to do that when all rights are reserved?

Mr. **Hutcheson**. If I could explain that, that individual there is an employee of the University of Florida. We found in developing computer software, someone found out that kind of a strange thing came about.

One case in point: A University developed a software package, let it out to the public, a vendor then took that software package, marketed it, and whenever they found the University was still using it they sued the University because they were using their own information.

So at this point in time, just to protect the University system, they copyright it and then they have a little bit of control. It's still public domain, but at least they are not in the position of maybe being sued by somebody in the industry because the University is still using its own information. That's kind of a screwy world to be in, but that's actually what happens.

Mr. **McGrath**. But what you are saying is that anything coming from GOES East, as long as somebody has a dish in order to accumulate that information, they can disseminate that information as long as they synthesize that information?

Mr. **Hutcheson**. I really can't answer that. We brought this down here, and while I am speaking for some of the people at the University of Florida, I don't have all the technical background to address that particular question.

Mr. McGRATH. I would like to find out that information and to allude to this in another subcommittee as to what is patentable and what is not.

I have no further questions Mr. Chairman.

Mr. LEWIS. Thank you, Mr. McGrath.

Mr. Hutcheson, although we can see these computers in front of us, what does the farmer have in front of him? Would this be an expensive system?

Mr. HUTCHESON. The farmer can get into this particular system for less than $5,000.

Mr. McGRATH. All this?

Mr. HUTCHESON. No, sir; one of these, not both.

Mr. McGRATH. We would just need one?

Mr. HUTCHESON. Yes, for $5,000 he could get into that system. So just to show you the interest, I guess, that is over the State of Florida, we probably had about 800 or so participants in computer programs, educational programs within the last 2 months.

So I think that shows the interest, and if you get around Palm Beach County very much and walk into a farmer's office, more and more when we walk in we see a microcomputer there, so it is something that is coming along.

Not everyone has them, only a small percentage, but it is something that is intriguing and they see a possibility there to make their operation run a little bit better.

Mr. LEWIS. Thank you, Mr. Hutcheson.

Any further questions from the members of the subcommittee?

Again thank you, Mr. Hutcheson. We appreciate your taking time to testify this morning and for showing the computer displays.

Mr. LEWIS. Our next witness is Mr. Roger Ball.

Mr. Ball, would you come to the witness table. Because of the time we are going to request you to hold your testimony to 10 minutes.

Do you have written testimony for the record, sir?

Mr. BALL. Yes, sir, I have.

Mr. LEWIS. OK.

Mr. BALL. Can I read a very brief statement?

Mr. LEWIS. Yes, you may do that, and your statement will be printed in full in the record.

STATEMENT OF ROGER BALL, FLORIDA WEATHER SERVICE

Mr. BALL. I want to thank you for the opportunity to speak to you today or to testify before you.

All agricultural weather services, private and Federal, should continue as they are, in my view, because they provide the necessary weather information for the general public and for clients requiring special, or detailed, at no cost or at a reasonable price, in the case of private weather forecasting companies.

The Federal Gvernment provides the following information for agricultural interests: General area and zone forecasts for rainfall, humidity, drying conditions and a three-day outlook for general weather and temperatures.

They also provide minimum temperature forecasts for the frost/freeze season and weekly crop bulleting summaries.

Private weather services, particularly Florida Weather Service, Inc. provide clients with a 2-day forecast and a 3-day outlook for their actual growing area. These forecasts include cloud cover, chance of precipitation and average amounts, maximum and minimum temperatures, relative humidity, wind speed and direction, weather discussions, annotated satellite pictures, transmitted on a telelphone/telecopier, updates as needed, and special frost/freeze and hurricane information.

Another special and extremely valuable service offered to clients is "nowcasting," which is a 1- to 3-hour notice of impending rain or thunderstorms issued to clients as satellite pictures are analyzed for developing cells of convectivity over a particular farming area.

The value of agricultural weather services to Florida cannot be overestimated. Farming interests are able to apply weather information to, one, reduce crop loss due to frost/freeze conditions;

Two. Reduce financial loss due to lost pesticides and fertilizers applied at the wrong times; and

Three. Better plan their operations to minimize loss due to weather elements, such as reducing irrigation or pumping when rain is forecast and reducing unnecessary labor forces when poor weather is indicated.

Currently, the National Weather Service and the private weather services complement and supplement each other. For small growing or farming operations the National Weather Service is a means of obtaining some useful weather information at no cost and some savings. For larger agricultural operations, which can afford private weather forecasting services, the savings are considerable.

In conclusion, we firmly believe that the public, specifically agricultural interests, would be severely damaged by the sale of the National Earth Satellite Service to a private company, because in the hands of one firm the sale of the satellite system could render the National Weather Service, as it now operates, defunct, and could leave small farms with no weather data at all.

Also, many private weather services, such as mine, would not be able to afford data acquisition and would be put out of business. Weather firms that could afford to purchase data would be forced to charge agricultural clients exorbitant fees in order to continue quality service.

In the best interests of all parties involved in this matter, we feel that selling the satellite system, which has been a recent topic, to be ruinous to agriculture, the National Weather Service, and the hundreds of private weather forecast businesses in this country. Therefore, we prefer the status quo.

Thank you.

[The prepared statement of Mr. Ball follows:]

FWS Florida Weather Service Inc.

31 SOUTH MAIN STREET BROOKSVILLE, FLORIDA 33512 (904) 796-1307 (813) 229-0777

29 March 1983

STATEMENT TO THE SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURAL RESEARCH AND ENVIRONMENT OF THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY REGARDING NATIONAL AND PRIVATE WEATHER FORECAST SERVICES FOR AGRICULTURAL INTERESTS: 31 March 1983

All current agricultural weather services, private and federal, should continue as they are because they provide the necessary weather information for the general public and for clients requiring special, or detailed, at no cost or at a reasonable price, in the case of private weather forecasting companies.

The federal government provides the following information for agricultural interests: General area and zone forecasts for rainfall, humidity, drying conditions, and a three day outlook for general weather and temperatures. They also provide minimum temperature forecasts for the frost/freeze season and weekly crop bulletin summaries. Private weather services, particularly Florida Weather Service, Inc., provide clients with a two day forecast and three day outlook for their actual growing area. These forecasts include cloud cover, chance of precipitation and average amounts, maximum and minimum temperatures, relative humidity, wind speed and direction, weather discussions, annoted satellite pictures, updates as needed, and special frost/freeze and hurricane information. Another special and extremely valuable service offered to clients is "nowcasting" which is a one to three hour notice of impending rain and thunderstorms issued to clients as satellite pictures are analyzed for developing cells of convectivity over a particular farming area.

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Currently, the National Weather Service and the private weather services complement and supplement each other. For small farming operations, the National Weather Service is a means of obtaining some useful weather information at no cost and some savings. For larger agricultural operations, which can afford private weather forecasting services, the savings are considerable.

In conclusion, we firmly believe that the public, specifically agricultural interests, would be severely damaged by the sale of the National Earth Satellite Service to a private company because, in the hands of one firm, the sale of the satellite system could render the National Weather Service, as it now operates, defunct and could leave small farms with no weather data at all. Also, many private weather services would not be able to afford data acquisition and would be put out of business. Weather firms that could afford to purchase data would be forced to charge agricultural clients exorbitant fees in order to continue quality service. In the best interests of all parties involved in this matter, we feel that selling the satellite system would be ruinous to agriculture, the National Weather Service, and the hundreds of private weather forecasts businesses.

Sincerely,

Roger S. Ball, Jr.
Roger S. Ball, Jr.
President and Director
Florida Weather Service, Inc.

Lois A. Bent
Lois A. Bent
Exec. Vice-President, Co-Director
Florida Weather Service, Inc.

LAB/lab

Mr. Lewis. Thank you, Mr. Ball.

Do you currently receive your weather data from the Government free of cost?

Mr. Ball. No, sir, we do not. In fact, if anything, other than a very, very minimal charge were involved, we couldn't afford it. We are a very small firm. There are about 300 or 400 of us in the country, and some of us are just barely for profit, as opposed to a nonprofit organization.

Mr. Lewis. What do you feel would be a reasonable price for a small farmer to pay you for your services?

Mr. Ball. Sir, our fees range anywhere from—and again I would like to point out we are providing a very specific and specialized forecast service—it can range from $250 to $350 per month to perhaps $2,000 or $3,000.

Mr. Lewis. Is that for forcasting per year, or per month?

Mr. Ball. No, sir. This is a monthly charge. But, generally speaking, our clients are paying us $350 per month. That is about all they can afford and this is even the larger, many of the larger clients. And we have some medium-sized clients. Some of the smaller fellows just can't afford it. They need, in my view, the services as currently rendered by the National Weather Service and, sir, if it weren't for Ruskin today, I wouldn't be in business.

Mr. Lewis. The gentleman from New York, Mr. Scheuer.

Mr. Scheuer. We have some value judgments to make here. You say you are in favor of the status quo.

Mr. Ball. Yes, sir.

Mr. Scheuer. I will give you some top secret information, which is that I am a Democrat. The Democrats aren't afraid of change. So

I feel a cold chill going up my spine when I hear somebody favoring the status quo, because that seems to imply the end of progress.

Now you may not be saying that, but what you may be repeating is the old, sainted American bit of folk wisdom, "If it ain't broke, don't fix it."

I take it that's more or less what you are saying; that the system is working pretty well the way it is.

Mr. **Ball**. Sir, I am certainly for progress, there is no question about that. I have stood for progress in science all of my life and I have worked in a number of areas where science has been a foremost topic.

I feel that the National Weather Service and the private meterological services can continue to work together rather than have a private industry, perhaps even one.

As I understand it, sir, there may be one or two large companies that have the capability of the buying satellite service that cost the taxpayers perhaps a billion dollars or more, maybe they want to buy it for $50 billion or $100 billion. I wouldn't see that as progress.

In fact, I think that the Federal Government should remain in the satellite business and not sell this valuable national resource to a private company which could put all of us, the National Weather Service and the small services out of business, because there would be one company dictating one price, and that's about the——

Mr. **Scheuer**. Well, what you are saying is purely conjecture, and I don't blame you and I don't criticize you for conjecturing, because the unfortunate fact of the matter is that with all the hyperbole that we are hearing about this transfer, we in the Congress have not yet had a specific workmanlike proposal for this transfer with an accompanying cost/benefit study. We do not have any proposal in front of us.

So I guess we all must conjecture. But I can assure you that Congress would look with great skepticism on a proposal that gave a monopoly to any one firm, be it COMSAT or any of the other major private sector companies, it give them a monopoly either on the control and distribution of weather services.

Mr. **Ball**. Yes, sir.

Mr. **Scheuer**. Let me ask you one question, out of your wisdom, maybe you can help us as we try and make our way through this fog of speculation, because, as I say, and it's a little bit embarassing at the Federal level for one branch to say the other branch has not done its homework, they have not presented us as yet with word one in terms of a workmanlike, professional, thoughtful feasibility analysis for either wiping out the weather service or, for that matter, for this proposed transfer of the remote sensing satellite services to private sector.

Hence, we hope that the Federal Government will present us with such a workmanship proposal and then we can avoid some of this speculation that both you and I are indulging in.

But just as a little matter of brainstorming, you probably know as much or more about the needs of the agricultural community than anybody appearing before us today, at least as much.

From your vantage point, looking at the needs of the agricultural sector, in what fashion could an improved system, both the Government Weather Forecasting Service and the private service that you are performing, how could those two institutions work to produce a better product, a more useful product for the farmers of our country?

Mr. BALL. Sir, I think that both the Federal and private sector are probably doing research in the development at least of ideas and methods of communicating. This, by the way, I find to be a very good idea, a low-cost system and I, while I haven't seen this, I have heard quite a bit about the system. It seems reasonable to us.

We feel that improved satellite pictures would be beneficial perhaps to the Federal sector as well as to ourselves. I am sure that NASA and the National Weather Service, the National Environmental Satellite services are working on trying to find better ways of presenting these pictures.

I will say these pictures as received in our office are rather remarkable. This is a half-mile resolution or one kilometer resolution picture of the State of Florida. And here, by the way, is a four kilometer or two-mile view. This is received by us on an Alden device by telephone line which produces this quality of a picture.

Mr. SCHEUER. Mr. Chairman, I ask unanimous consent that we get copies of those pictures and include those pictures in the record.

Mr. BALL. I will be happy to give them to you, sir.

Mr. SCHEUER. Thank you very much, sir. That's very interesting. You mean that first picture you showed us is one kilometer square?

Mr. BALL. Yes, sir. I think that's one kilometer or a half nautical mile resolution picture that we use in our operations. Ruskin uses it too and, coincidentally, we get excellent cooperation from Ruskin.

I am able to pick up the telephone and call the Ruskin office and ask them for a particular picture, and if it does not cause them any inconvenience at the time, they will switch the line and allow me to have a particular picture that I might need. Of course, their needs are first.

Mr. SCHEUER. Giving you a particular farm?

Mr. BALL. Well, for the entire State. We might have or we might be looking at a low pressure system developing in the Gulf and want a particular picture of it to get an overall view of it and, coincidentally, these same pictures are of value to Ruskin, too.

Mr. SCHEUER. Well, let me just get back to my question. If we were sitting there brainstorming and we gave you a ten point wish list, all you had to do is pass this on to the tooth fairy, what would you wish for, for your clients, for American farmers? What kind of information could we give them that would help them do their job more effectively, in a more labor saving way, in a more cost-effective way, producing a better product for the American consumer for less money? What science and technology knowledge could we give them that would help them do that job?

Mr. BALL. Sir, I hate to be a dummy, but I find it difficult to answer that question in other than general terms. I feel that the frost/freeze office at Ruskin is doing an excellent job in providing a general forecast to the farmer, and I believe that we as a firm in providing a specialized forecast product for a given farming area, smaller area, mesoscale area, if I might say, to be very good.

As time goes on we become more proficient in the services that we render. So the raw materials that we are using, I feel, are excellent. Possibly at some time in the future the availability of unclassified defense meteorological satellite data could be valuable, but the National Weather Service in a sense has its own TYROS N, which is something like the defense meterological satellite.

So I think we are doing pretty well today. I think that as time goes on improvements will be made in the satellite services. I would like to see the services continue as they are, with gradual improvements made, with time. I think we are doing a good job today for America's farmers.

Mr. McGrath. Will you yield?

Mr. Scheuer. Happy to yield.

Mr. McGrath. I think perhaps the answer you are trying to elicit is one that perhaps is not found in weather technology. The whole area of remote sensing and the whole area of soil sampling and satellite pictures of soil and things like that may be the type of information that would be as beneficial or more beneficial than that of either weather information or any other kind of information we may be able to give to the farmers at this particular time.

That is a whole other question. Other than the transfer of the technology of weather information, the whole other question is the transfer of technology of remote sensing and land sensing information, all of which seemingly is being put into this package of the transfer of total technology from our satellite systems to the private sector.

In my own estimation, weather service satellite systems should not be, because there is no market for the data, other than the National Weather Service and State governments and local governments. The system should not be transferred in any way, shape, or form, because such a transfer is hazardous, in my belief, to the public health, wealth, and safety.

Land-sensing satellites, remote-sensing satellites, is a different story, and at the present time my opinion is out on that, although I am leaning toward not supporting that particular avenue of transfer either.

Let's just take a look at this: If this is one kilometer we can get resolutions within feet with present Landsat and Metsat information, we can get it within feet, so we could actually hit particular farms if we wanted to.

Mr. Scheuer. Well, actually, that was just what I was leading up to. With a picture of 1 kilometer, that would cover most farms in the United States, not the vast Texas farmer, and most farmers would be able to find themselves in a 1-kilometer picture.

Supporting we had a feed-in to each farm in these kinds of pictures once or twice a day or once a week, whatever was the most helpful, plus information on what prospective changes could be predicted over, well, over the "now forecasting" time of 1 to 3 hours, in a day, a week, a month, and so forth.

Suppose you ~~had a~~ little machine in each farmer's study hooked to his telephone that would give him a picture like this, as I say, once or twice a day or however often it would be helpful to him, along with useful predictive information for his actual farm. Would that be an advance over what the individual farmer has now?

Mr. BALL. Sir, I would say it sounds to me like it would be a good idea, but he might have a little problem; that is, interpreting the satellite picture. Satellite interpretation can be hazardous unless you know what you are doing.

Mr. SCHEUER. He has to have that interpretation?

Mr. BALL. That's correct.

Mr. SCHEUER. Let me just ask one question.

Mr. BALL. Here we are looking at many, many farms in Florida, or for that matter throughout the country.

Mr. SCHEUER. Let me just ask one last question, for my own information.

The "nowcasting" which you provide, which is a 1- to 3-hour prediction, if you tell a farmer what is going to happen in his area in an hour or 2 or 3 hours, what can he do to take advantage of that in that short a timeframe?

Mr. BALL. Thank you, sir, for asking that question.

Mr. SCHEUER. It was spontaneous and unrehearsed. I want the record to show that.

Mr. BALL. Sir, by using a series of satellite pictures, one or two pictures, you can determine the movement or development of a single cell of convectivity; in other words, a thunderstorm, long before they are detected. Radar is useful. Anyone can look out the window too and see rain, but if you can use a satellite picture to note the developing cell and than watch the movement of that cell, you can tell a farmer that he is going to have rain with 1, 2, or 3 hours.

Mr. SCHEUER. What can he do to take advantage?

Mr. BALL. The advantage, sir, to this is that if he is out fertilizing or spraying by air or ground he can stop the spraying immediately, for example, because oil-base sprays today have a tremendous cost and oil-base sprays need about an hour's drying time on say an orange tree or on any crop.

I am not a plant pathologist so I can't answer too much about pesticides, but I can say that if the spraying is stopped or started, based on the weather information, this can be a tremendous advantage, of tremendous value to him.

Certainly we are out to try to save the farmers as many dollars as possible, and this is passed on to the consumers in this country. So again, I appreciate your asking that question. "Nowcasting" can be used, and to the farmer's advantage.

Mr. SCHEUER. I thank you, Mr. Chairman.

Mr. LEWIS. Thank you, Mr. Scheuer.

The gentleman from New York, Mr. McGrath.

Mr. MCGRATH. Do you know of any market other than the National Weather Service, State governments, local governments, for weather information other than small outfits like yourselves?

Mr. BALL. Do I know of any other market?

Mr. MCGRATH. Yes; markets for the information, and we are collecting a tremendous amount of data.

The presumption in the transfer of this technology is that there is a private market out there to take the place of the information that we are presently providing for nothing to the National Weather Service, the State government, the local government, and there is some price people like yourself would pay.

What is the percentage of the market that receives data for free at this present time? Isn't it about 90 percent, 95 percent of the market doesn't pay a thing for the National Weather Service information?

Mr. **Ball**. I would say that's probably a very good point. And if private meteorologists today, who are very small, had to pay for it or had to pay more than the nominal fee, they couldn't exist, couldn't provide the service and, in fact, if there were a large cost for any of this data, our clients couldn't afford the services, and they do need some specialized services.

Mr. **McGrath**. Is there any under redundancy between what you do and what Ruskin does?

Mr. **Ball**. No, sir. I think we complement and supplement each other. Ruskin provides a general forecast, general information; we provide a more specific type of information for our clients.

Mr. **McGrath**. I have no further questions, Mr. Chairman.

Mr. **Ball**. So there is a difference; there is a difference.

Mr. **Lewis**. Thank you, Mr McGrath.

Thank you, Mr. Ball, for taking the time to come down and present testimony. We appreciate that.

Mr. **Ball**. Thank you very much, sir.

Mr. **Lewis**. Next we will have a panel of Mr. Fred Crosby and Mr. Robert Case. Mr. Crosby and Mr. Case, please come to the witness table.

Mr. Fred Crosby is from the Ruskin Weather Station in Ruskin, Fla., and Mr. Robert Case is a hurricane specialist from the National Weather Service.

Mr. Crosby, if you will begin, please, and give us a 10-minute summary of your testimony. Your entire statement will be entered into the record. Next, Mr. Case, following your testimony, we will have questions.

STATEMENTS OF FRED CROSBY, RUSKIN WEATHER STATION, RUSKIN, FLA., AND ROBERT CASE, HURRICANE SPECIALIST, NATIONAL WEATHER SERVICE

Mr. **Crosby**. Thank you, Mr. Chairman, members of the subcommittee. I do appreciate the opportunity to discuss with you the services provided to Florida's agricultural community by the Ruskin office of the weather service.

I am sure you know that in addition to an agricultural weather program there are a number of other programs assigned to the office, but I will confine my remarks to the agricultural program.

The service to Florida agriculture, also known as the Federal/State Agricultural Weather Service, has been a cooperative effort with the University of Florida's Institute of Food and Agricultural Sciences since the mid-1930's.

IFAS does provide us with some manpower: One full-time secretary and one part-time technician; and some funds for equipment, travel and maintenance.

Through the years the National Weather Service staff has worked with IFAS researchers on freeze and frost protection methods and weather forcasting improvement.

The latest effort has been the development of the SFFS system, the one that Mr. Hutcheson showed you here a few minutes ago.

In addition to the SFFS information and the observations from the basic NWS observational networks, the program uses specialized observations of parameters such as leaf wetness and soil temperatures from 10 locations around the State.

Many of the locations are at agricultural research centers of IFAS, and the reports are made by cooperative observers using NWS instruments.

The observations are used in the formulation of forecasts and advisories to growers to develop a climatology of weather elements important to farming operations, and as a guide to growers in their daily decisionmaking.

I will discusss the forecasts and advisories in just a moment.

The Tampa area of the Ruskin office provides many agricultural weather products. We produce the peninsula Florida farm area minimum temperature forecasts; we maintain the minimum temperature survey program; we produce the Florida farm area weather forecast, a weekly weather summary and climatological services program.

The peninsular Florida farm area minimum temperature forecast or so-called fruit frost forecast is issued three times daily from November 1 through March 31. Included in this forecast are the meterological elements which do have an effect on the temperature, such as clouds and winds, as well as frost or no frost forecast and a duration forecast; that is, how long the temperatures will be below certain critical levels.

On cold nights we issue this at 2-hour intervals and include minimum temperature forecasts for about 100 specific locations.

The growers use this information in their decisions as to whether to expend energy and money for frost protection, and the vegetable and nursery industries, as has been mentioned, as well as the citrus and sugar cane, are also users of this product.

The minimum temperature survey program gives us information for the preparation of forecasts and helps other groups or agencies such as the Florida Department of Citrus in their deliberations on whether to embargo fruit after a freeze.

During the frost season, with the cooperation of growers, agricultural cooperatives, the Florida Citrus Mutual, various companies, IFAS, and the Florida Department of Agriculture's Division of Forestry, we do maintain a network of some 150 temperature stations across the peninsula.

Most of the equipment is owned and maintained either by the State or by NWS, with IFAS contributing the primary funding.

This network gives us records of the lowest temperatures reached as well as the duration of temperatures below critical levels.

in addition to the fruit frost forecast, the Florida farm area forecast is issued twice daily throughout the year, since Florida is one of the places in the country with heavy agricultural activity all year.

We concentrate on the meteorological elements having a large impact on farming operations and not normally seen in the real-time public forecasts, such as rainfall amounts, drying potential, dew, humidity, and so forth.

This information is a guide for growers in a day-to-day operations to achieve maximum efficiency and economy for their efforts.

A weekly weather summary of temperature, rainfall, and so forth is provided to the Statistical Reporting Service of USDA for the formulation of Florida's Weekly Weather and Crop Summary and the National Weekly Weather and Crop Bulletin, and for the calculation of the Drought Severity Index.

Information from all sources, our cooperative observation program, fire weather program, hydrology program, is used in these summaries. This information is helpful to the Florida farmers in making crop management and marketing decisions, among others.

Our office also provides certain climatological services to agriculture. First, an annual report is prepared at the end of each frost/freeze season with a summary of temperatures and durations. This report is used by a variety of people, researchers, industry, State, and Federal agencies, and so forth.

Second, the office handles random requests for specific locations and/or histories by growers making long-term decisions as to what varieties to plant.

The information produced under these programs reaches the industry in a variety of ways. The daily forecasts and special issuances are available over NOAA weather wire, teletype circuits, the various NOAA weather radios in Florida, several of IFAS' cooperative extension service offices at the county level, as has already been mentioned, through Florida citrus mutual's freeze watch program on freeze nights, and via telephone.

The Weekly Weather Summaries are published at the National and State levels and they are available by subscription.

We also cooperate with the Florida Crop and Livestock Reporting Service and the Florida Department of Agriculture's Division of Marketing in providing information to the agricultural industry.

Mr. Chairman, I hope I have provided the information you need and want, and I will be glad to try to answer any questions.

[The prepared statement of Mr. Crosby follows:]

Statement By Frederick L. Crosby,
Meteorologist in Charge,
Tampa Bay Area Weather Service Office,
National Weather Service,
National Oceanic and Atmospheric Administration,
U.S. Department of Commerce

Before the Subcommittee on
Natural Resources and the Environment
of the
Committee on Science and Technology
House of Representatives

March 31, 1983

Mr. Chairman, Members of the Subcommittee:

I appreciate the opportunity to discuss with you the services provided to Florida's agricultural community by the Ruskin Office of the National Weather Service (NWS).

I'm sure you know that in addition to an agricultural Weather Program there are a number of other programs assigned to the office, but I will confine my remarks to the Agricultural Program.

The service to Florida agriculture, also known as the Federal-State Agricultural Weather Service, has been a cooperative effort with the University of Florida's Institute of Food and Agricultural Sciences (IFAS) since the mid

1930's. IFAS provides us with some manpower, one full-time secretary and one part-time technician, and some funds for equipment, travel, and maintenance.

Through the years, the NWS staff has worked with IFAS researchers on freeze and frost protection methods and weather forecast improvement. The latest effort has been the development of what we call the Satellite Freeze Forecast System (SFFS). This project was developed to be a tool for the forecaster faced with making precise minimum temperature forecasts during the winter. The system uses meteorological satellite measurements and displays a picture of the ground temperature at half-hour intervals on cold nights. It also has a forecast model that predicts the temperature distribution on the peninsula at various hours during the night.

In addition to the SFFS information and the observations from the basic NWS observational networks, the program uses specialized observations of parameters such as leaf wetness and soil temperatures from 10 locations around the state. Many of the locations are at Agricultural Research Centers (IFAS), and the reports are made by cooperative observers using NWS instruments. The observations are used in the formulation of forecasts and advisories to growers, to develop a climatology of weather elements important to farming operations, and as a guide to growers in their daily decision making. I'll discuss the forecasts and advisories in more detail shortly.

The Tampa Bay Area WSO provides many agricultural weather service products: the Peninsular Florida Farm Area Minimum Temperature Forecast, the Minimum Temperature Survey, the Florida Farm Area Weather Forecast, the Weekly Weather Summary, and a climatological services program.

The Peninsular Florida Farm Area Minimum Temperature Forecast, or so-called "fruit-frost" forecast, is issued three times daily from November 1 through March 31 each year. Included in this forecast are the meteorological elements which have an effect on temperatures (i.e., winds, clouds, etc.) as well as a frost/no frost forecast and a duration forecast (how long the temperatures will be below a certain critical level). On cold nights we issue this at two-hour intervals and include minimum temperature forecasts for about 100 specific locations. The growers use this information in their decisions as to whether to expend energy and money on frost protection. The vegetable and nursery industries, as well as the citrus and sugar cane industries, are also users of this product.

The Minimum Temperature Survey Program gives us the information for the preparation of forecasts, and helps other groups or agencies such as the Florida Department of Citrus in their deliberation on whether to embargo fruit after a freeze. During the frost season, with the cooperation of growers, agricultural cooperatives, the Florida Citrus Mutual, various companies, IFAS, and the Florida Department of Agriculture's Division of Forestry, we maintain a network of some 150 temperature stations across the Florida Peninsula. Most of the equipment is owned and maintained either by the State or by NWS, with IFAS contributing the primary funding. This network gives us records of the lowest temperatures reached, as well as the duration of temperatures below the critical level.

In addition to the Fruit-Frost products, the Florida Farm Area Weather Forecast is issued twice daily throughout the year since Florida is one of the places in the country with heavy agricultural activity all year. We concentrate on the meteorological elements having a large impact on farming operations and not normally seen in the realtime public forecasts (rainfall amounts, drying potential, dew, humidity, etc.). This information is a guide for growers in day-to-day operations to achieve maximum effieiency and economy for their efforts.

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Our office also provides certain climatological services to agriculture. First, an annual report is prepared at the end of each frost-freeze season, with a summary of temperatures and durations. This report is used by a variety of people (researchers, industry, state, and Federal agencies, etc.). Secondly, the office handles random requests for specific locations and/or histories by farmers making long term decisions such as what fruit or crop varieties to plant.

The information produced under these programs reaches the industry in a variety of ways. The daily forecast products and special issuances are available over NOAA Weather Wire (teletype circuit), the various NOAA Weather Radios in Florida, several of IFAS's Cooperative Extension Service Offices at the county level via electronic secretary type devices, through Florida Citrus Mutual's Freeze Watch Program on freeze nights, and via telephone. The Weekly Weather Summaries are published at the National and State levels and are available by subscription. We also cooperate with the Florida Crop and Livestock Reporting Service and Florida Department of Agriculture's Division of Marketing in providing information to the agricultural industry.

Mr. Chairman, I hope I have provided the information you need.

Thank you.

Mr. LEWIS. Thank you, Mr. Crosby. Now we will hear from Mr. Case, and then we will have questions for both of you.

Mr. CASE. Do I have a live mike here?

Mr. LEWIS. You are on the line.

Mr. CASE. Thank you, Mr. Chairman, committee members. I have to admit, being from the National Hurricane Center, I was rather surprised at the invitation, which was received rather late, so I have no official statement, but I would say this:

The National Hurricane Center has the overall responsibilities for the hurricane warning service for the Atlantic. We have final authority for all meteorological decisions concerning the forecasting of tropical and subtropical systems in this area and operate as a hurricane warning office.

The Hurricane Center determines the total National Weather Service requirements for aircraft reconnaissance and issues all public, military, marine, and aviation advisories for the Atlantic Basin.

Users of our product include the marine community, aviation interests, and the public in general. Users are also international in scope since all of the countries in the Western Atlantic Basin, which includes the Caribbean and the Gulf of Mexico, look to the Hurricane Center for hurricane guidance.

Since the Hurricane Center does not issue a specific advisory for the agriculture industry, the industry would use the public advisory issued by NHC as a form of guidance in responding to the threats of hurricanes; therefore it would be impossible for the Hurricane Center to estimate a cost effectiveness of this service as it pertains to the agriculture industry.

Mr. LEWIS. Mr. Case, let explain why you are here.

Mr. Scheuer and I are also concerned about satellite programs. Since you handle the hurricane warning system for the east coast, we felt it would be interesting to have you appear before the committee so that members could ask you questions about the satellite programs and their effects on the hurricane warning system. This warning system plays a vital role when a severe storm threatens extensive damage to property and agricultural crops.

Mr. **Case**. OK. I would say this. The biggest advancement and the greatest step forward in hurricane warning was the advent of the satellite. The satellite has given us all types of possibilities that hitherto never existed.

Our first line of defense in the event of a hurricane is the satellite and the satellite is useful right up until landfall, which, of course, at that time it is complemented, then, with the aircraft and the radar, but the hurricane warning system, the grassroots of it at this point in time, start with the satellite.

Mr. **Lewis**. Are you satisfied with the operation of the satellite system now as it transmits information to you and to the Hurricane Center?

Mr. **Case**. Yes. We are fortunate at the Hurricane Center because we are colocated with a NESS office, which is the National Environmental Satellite Service, so we have a direct—we receive the information from the satellite, we could get a picture in every 5 minutes if necessary in that type of situation, so we are well taken care of as far as the satellite is concerned at this point in time.

Mr. **Lewis**. If the satellite was transferred to the private sector would you feel comfortable operating in the Hurricane Center?

Now I am asking you to speculate, which I don't want you to do.

How would you feel if it were taken out of the Government's hands and placed in the private sector and you had to work from that mode; would you be comfortable?

Mr. **Case**. You are asking something, of course, that is going to be my opinion and conjecture on my part.

Mr. **Lewis**. That's correct.

Mr. **Case**. But, no, I would not be comfortable at all. We have a very excellent working relationship with the inner groups right now, the NESS and the National Weather Service, and, matter of fact, steps are being taken right now to streamline the situation and the NESS office is in the process of actually being taken under the organization of the Hurricane Center itself.

So essentially this means that we have the direct contact to the satellite and to the use of the satellite and we have no emissaries or go-betweens that probably would be the case if it went into private hands. I am sure that we would end up having difficulties or problems in some way, shape, or form.

This way we have a direct contact with it. It almost is treated and used as if it were our own, and this is the only way that it can be because of the necessity of having the data, live, instantaneous, with no delays, which was one of the big problems when the satellite was first put up.

We would get pictures, but unfortunately they would be an hour, several hours, when the first satellites went up we could only get them twice a day, so we have progressed step by step to where, as I said, we can have a satellite picture every 10—5 or 10 minutes, if necessary. And we also have the capabilities of having them now at every 20 minutes or half hour and we make our own moves and everything, so I am sure that if the satellite went into private hands it would be a step backward and not forward.

Mr. LEWIS. What additional research or study is necessary in order to improve the benefits provided currently by the hurricane forecasting service?

Mr. CASE. Could you repeat that, please?

Mr. LEWIS. What additional research or study do you feel, in your opinion, is necessary in order to improve the benefits provided by the current hurricane forecasting service? How can the service be improved?

Mr. CASE. How could the hurricane warning service be improved?

Mr. LEWIS. Yes.

Mr. CASE. Probably——

Mr. LEWIS. We still have a little problem when the storm is right on the coast and moving up the coast and determining whether it is going to go inland later or not. Are you getting any closer to pinpointing that?

Mr. CASE. That is one of our biggest problems, and Dr. Neil Frank, who is the Director of the Center, has acknowledged this.

Research has been the solution all through, in the past years, through research we find better ways to predict and to forecast; however, in the last 10 to 15 years our studies have shown that we almost have reached a plateau on our capabilities of more accurate forecasting.

Right now, again, I am a working meteorologist faced with the warning aspect, and Dr. Frank feels as though we can most help the general public at this point in time by informing them.

In other words, a preparedness mode is more or less the operation that we have taken at the Hurricane Center itself.

Now, there is still research going on, but we feel uneasy with the advances that have been made over the last 10 to 20 years in the area of research, as giving us more capabilities of more accurate forecasts.

So we have reached a situation where that we have a lot of people on the coastline, there are just millions and millions of people on the coastline, and their lives could potentially be in danger, and one of the major reasons that they could be in danger is because of our inability to forecast accurately.

So as a result we want to try and get this message to the people, make them realize our limitations and through the use of preparedness, hopefully, in the event of a major catastrophe, hurricane, major type 5 storm, we can save the lives of people on the immediate coast.

Mr. LEWIS. Mr. Scheuer?

Mr. SCHEUR. Thank you, Mr. Case.

I would like to ask a few questions of Mr. Crosby. The agricultural weather services has been criticized as benefiting only one industry and, therefore, should be supported by that industry. Will you comment on the benefits to the service and if user fees should support the program?

Mr. CROSBY. Our agricultural weather probgram here in Florida at the present time I think benefits more than just one small segment of the agricultural industry. I think it trickles right on down to the consumer and to the price of food at the supermarket.

So in that respect I think that it is of benefit more than just to one segment of the industry I think there is a big benefit for the cost that is involved. I think there is a big benefit to the general public as well.

Mr. Lewis. I see. What are some of the research needs in agricultural weather services now? Do you have any feel for that?

Mr. Crosby. We do have. The Weather Service does have a few offices, like at Auburn and Stoneville, Miss., College Station, Tex., Purdue, up in Indiana, where we have a group of meteorologists who are doing some research with agricultural people to better utilize what weather information is available, applying the weather information to crop pests, and this type of informtion.

It is not a very big effort with the National Weather Service. There are only the four centers that are involved. But some of that type of information, linking weather information to agricultural interests, agricultural farming types and so forth, I think is a definite benefit. It is kind of a small effort in this country at the present time.

Mr. Lewis. Let me ask this: Considering what you have just stated and the additional research that is needed, if agricultural weather services were provided by the private sector, do you think that would have an impact on the amount of research that is being done right now and on further research?

Mr. Crosby. If the private sector——

Mr. Lewis. If the private sector were to take over the agricultural weather services that you are now providing, do you feel that that would have an impact on the research that is currently being done and any further research?

Mr. Crosby. I think it would, in that we would probably—there would not be—even the effect that is being put forth now, with meteorologists working with agricultural researchers, that would go by the wayside.

The information that is now generally available to all segments of the agricultural industry, I think would not be available as generally without cost.

Mr. Lewis. Mr. Scheuer.

Mr. Scheuer. No questions, Mr. Chairman. Thank you.

Mr. Lewis. Thank you.

Mr. McGrath?

Mr. McGrath. Mr. Case, on your forecasting for hurricanes, do you use the GOES East statellite or the Polar orbiting satellites?

Mr. Case. We use the GOES East because it is geostationary and it gives us a continuous chance for pictures.

Mr. McGrath. I am living on the water up in New York, on Long Island, and I am most interested in your capability of predicting hurricanes. What is your pleasure for fiscal year 1983 and what is the projected budget for fiscal year 1984?

Mr. Case. I don't—I cannot answer that question.

Mr. McGrath. Mr. Chairman, could we hold the record open, as far as I am concerned, hold the record open so that information may be inserted?

Mr. Case. This pertains to the Hurricane Center?

Mr. **McGrath**. Yes.

Mr. **Lewis**. Mr. Chairman, I would like to also extend that opportunity to Mr. Crosby, and hold the record open for 10 days to answer questions.

Hearing no objection, so ordered.

[The information was never submitted.]

Mr. **Case**. Mr. McGrath, I would like to address a comment there on the satellite. Being from the New York area, you probably are familiar with the 1938 hurricane.

OK. May I assumed. Anyway, in 1938——

Mr. **McGrath**. It was about 3 years before I was a gleam in my father's eye.

Mr. **Case**. In 1938 a hurricane raced up the east coast and one of the biggest problems and one of the reasons for devastation and deaths and destruction was the fact that the people of New England, New York, and Long Island included, did not know, nor did the Weather Service know precisely where the storm was.

Many times they will accelerate—hurricane will accelerate 40, 50, 60 miles per hour in its forward motion as it goes north at 30 degrees north.

The satellite, for example, nowadays would have alleviated that problem. Had we had a satellite back then, the Weather Service could have immediately seen the acceleration that was taking place and the warnings could have been placed properly. So this is an example where the satellite is just impossible to replace in this sense.

There are times in other situations where the satellite cannot help us, but that is an example of where the satellite would have saved a lot of life and property.

Mr. **McGrath**. I have no further questions.

Mr. **Lewis**. Thank you, Mr. McGrath.

Thank you, Mr. Crosby and Mr. Case. We appreciate your coming to testify for us.

Mr. **Lewis**. For our final panel, we are going to have five people who will be giving testimony at the same time. They are Mr. Dennis Emerson, Mr. Frank Teets, Mr. Dan Richardson, Mr. David Beardsley, and Mr. Valjean Haley.

This panel is a users panel, people that use the services of the agricultural weather service, and they will provide testimony as to how this service is being used, and how effective it is.

Mr. Dennis Emerson is with the Florida Farm Bureau; Frank Teets is the president of the Florida Fruit and Vegetable Association, South Bay Growers; Dan Richardson is representing the citrus growers; Mr. David L. Beardsley is president of the Hendry County Farm Bureau; and Mr. Valjean Haley is chairman of the East Coast Growers.

Gentlemen, all of your written testimony will be included in the record, and, because there are five of you and time is running out on us, we would ask you to keep your testimony as short as possible.

We will start with Mr. Emerson.

STATEMENTS OF DENNIS EMERSON, FLORIDA FARM BUREAU, FRANK TEETS, PRESIDENT, FLORIDA FRUIT AND VEGETABLE ASSOCIATION, SOUTH BAY GROWERS; DAN RICHARDSON, CITRUS GROWER; DAVID L. BEARDSLEY, PRESIDENT, HENDRY COUNTY FARM BUREAU; VALJEAN HALEY, CHAIRMAN, EAST COAST GROWERS

Mr. **Emerson**. Thank you, Mr. Chairman, and members of the committee. I appreciate the opportunity to be here presenting some remarks on this important subject.

We are greatly concerned over the recent proposal by the Department of Commerce to eliminate the agricultural weather services, the fruit frost support service, the aviation area forecast programs, and we are concerned about reduced funding for the fire weather program.

This proposal as presented and outlined by Dr. John V. Byrne, who is Administrator of NOAA; Malcolm Baldrige, Secretary of Commerce, and administration attempts to justify this nonfunding by saying, No. 1, that this service is serving a single-interest, limited-population growth, and should not continue at taxpayer expense; and second, this service can be provided by the private sector.

I would like to ask you to allow me to address these statements as well as to express some other areas of concern, in an effort to point out the necessity of retaining this vital service.

I would like to point out first of all that the Farm Bureau wholeheatedly supports reduced Government spending, a balanced budget, elimination of Federal waste and abuse of taxpayers' dollars.

We supported the 20-percent reduction in the USDA's 1983 budget as well as holding the line on increased commodity price supports for 1984.

We supported the 50-percent reduction of the staff 2 years ago of the National Weather Service system at Ruskin. We have supported in every case cutbacks where and when possible in order to reduce Federal spending and Federal fat.

Now I say all of this to demonstrate that we are not hypocritical in our request for retention of this service, nor are we for cutting everyone else and exempting agriculture.

Cash receipts from the marketing of agricultural products in Florida alone total more than $4 billion on the farm level. You couple this with the purchase of over $8 billion in goods and services provided by the agriculture producers and agriculture-related enterprises and you can readily see that we make a substantial contribution to the State's economy of almost $12 billion.

Florida agriculture employs 112,000 on-farm workers and numerous thousands of off-farm workers who actively engage in the processing, the packaging, the retailing, et cetera. So close to one-fourth of Florida's work force is employed directly or indirectly by Florida agricultural concerns.

You have before you in my statement some of the Florida farm facts. Ninety percent of the Nation's orange concentrate is grown and processed in Florida; No. 1 in the Nation in production of snap beans, cabbage, tomatoes, sweet corn, cucumbers, eggplant, escarole, green peppers, watermelons, foliage plants, sugarcane, and honey; and No. 2 in many, many other areas.

These facts are presented not in a boastful manner, although we are proud of their contributions, but, rather to indicate the magnitude of impact upon a very large and very necessary industry who depends upon timely, accurate weather services.

The function of the National Weather Service station at Ruskin, Fla. is vital to Florida agriculture. Its value has been demonstrated again and again as frost and freeze threatened Florida's citrus and vegetable crops. It has an even greater future in Florida's vast farm and agribusiness structure as we move into the computer age.

We should not look at the weather services as something new in agriculture. In fact, the Nation's Weather Service was born and nurtured under the auspices of the U.S. Department of Agriculture from 1890 to 1940.

It was during this 50 years under the Department of Agriculture that many of the basic programs used today were developed to support this vital industry.

Unfortunately, the Commerce Department doesn't share the same degree of responsibility to our Nation's most important industry.

We in agriculture have come to depend upon and rely upon timely, accurate, and specialized agriculture weather information. The loss of this service undoubtedly result in higher prices to consumers through costs of crop loss.

Some of the specific areas of uniqueness and value are: No. 1 is in forestry. The Weather Service station plays a key role in the protection of Florida forests, of which we have over 17 million acres, by providing information constantly on the temperature and relative humidity and other weather conditions which help gage the danger of fires and assists the division of forestry in making preparations during fire seasons.

Continuous weather mapping also assists our foresters in keeping tabs on forest insect activity in timing the application of pesticides.

The ground link station, as Mr. Hutcheson has already mentioned, I will not even mention that any further other than to say that it is a vital link in the overall complex of our communications system.

The fruits and vegetables. Only the National Weather Service has the capability, the training, and the equipment to adequately supply the service necessary to help growers minimize losses due to frost and freeze danger.

Without early warning of damaging temperatures growers could lose millions of dollars in a single night. Fred Crosby, the chief meteorologist at Ruskin, is quoted as saying, "In the January 1977 freeze the information we provided saved citrus growers in Lake and Orange Counties alone between $5 million and $7 million."

Lake and Orange are only two counties of approximately 25 that produce large volumes of citrus.

Now, the December 1981 freeze and the January 1982 freeze could far exceed these figures. It has been documented that one accurate forecast in 1978 for the freeze in Tulare County, Calif. saved $25 million worth of citrus.

The California Extension Service indicates a minimum of 10 percent of the value of frost-sensitive crops in California are attributed to agricultural weather information. This totals to approximately $400 million worth of benefit in California alone.

Ruskin gives out special reports every 2 hours during severe weather periods. Information on winds, clouds, projected low temperature hours, duration periods, and et cetera.

This timely, critical information allows growers to make their decisions, decisions that not only make the difference between profit and loss but actually weather that farmer will be in the business next year doing the things that he knows how to do best, and that is produce the necessary food and fiber for this country and half the world.

Growers make important decisions based on Ruskin reports. These decisions often save Florida farmers millions of dollars, and can possibly do this overnight.

Strawberry producers, fern growers, and other horticulturists depend upon Ruskin information to determine the exact time to turn on irrigation spray pumps or to use helicopter service.

This represents thousands of dollars to the growers who can wait and not turn on water before necessary, or start choppers before necessary.

Gentleman, even an hour can make a tremendous difference between profit and loss, between survival or bankruptcy.

Citrus growers save millions of dollars by saving water, by saving energy, by saving manpower, by waiting until the critical time to start sprinklers or turn on powerful wind machines or lighting expensive petroleum-filled smudge pots.

Correct decisions means that growers can combat the effects of adverse weather, particularly critically low temperatures.

In other words, growers can reduce or eliminate frost damage without expensive over protecting, or, the worst, of under protecting their crops.

In addition to the regular weather advisories the agricultural Weather Service provides information on soil temperatures, wind speed and velocity, evaporation rates, vegetative wetting, dewponts, et cetera.

Careful analysis of soil temperature and moisture measurement are needed to establish appropriate planting times. For example, corn will germinate and grow if the soil temperature is at least 55 degrees Fahrenheit at the 4-inch level when measured at 1 p.m.; wheat at 40 degrees.

Now, each day's delay in planting can mean a loss of between 1 to 4 bushels per acre. So you can readily see a farmer with 2,000 acres of soy beans can possibly lose 8,000 bushels of beans because he delayed planting.

Precise analysis of wind speed and direction and humidity are essential for agricultural aviators to minimize the application of costly agricultural chemicals, and it is also very essential to minimize the drift of these toxic chemicals.

One unexpected rainstorm following a pesticide application could result in losses of over $1 million in the Midsouth States.

Integrated past management programs are just getting off the ground on the State level in Florida and the weather data which is an important element of such programs will not be able if the shutdown goes through.

IPM relies on various daily weather parameters in forecasting insect buildups and other insect population dynamics.

The move is on in the State of Florida to reduce costly chemical use. We can do this by IPM, genetic engineering. However, this progress may be lost if we lose our valuable tool of weather information.

Representative David Bowen of Mississippi said recently that, "Studies conducted in Mississippi indicate that farmers have been able to achieve an average of 7 percent greater cash farm receipts as a result of eliminating preventable weather losses though services provided by the NOAA agricultural weather service there."

We have not conducted such a study, to my knowledge, in Florida but I think from experience we could conservatively estimate the percentage would be even greater than 30 percent.

Many growers, packers, and shippers depend upon current, accurate, up-to-date weather information for lining up work crews. The commencement of work for the crews and/or the decision to call the crews is based on weather.

It is an almost automatic procedure by many of our growers to begin and end each day by consulting the NOAA weather forecast.

Should a crew be called and due to unexpected weather they are unable to work, the grower, the packer or the shipper is still liable for that standby time of the crew. This can easily amount to an unnecessary expense of thousands of dollars to the grower, where crews number in the hundreds.

Water requests: In talking with some California farmers recently they tell me that they depend exclusively on the National Agricultural Weather Service for long-range forecasts for ordering water. Many have to order water 4 to 10 days in advance, and any unanticipated rain or heat wave or frost can easily mean that they will either have to dump water or ration it. But, either way, it costs the grower because when you order water you have to take it, and when you take it you are charged for it. So it costs the grower, but with the accurate long-range weather forecasts and advisories the risk is minimized.

In rebuttal to the proposition that this service is serving a single interest group, agriculture, I submit the reasoning that agriculture, our Nation's largest industry, our Nation's largest employer, our Nation's largest contributor to the surplus position of our international balance or payments—I am talking about farm exports and the fact that agricultural farm productivity allows us to have the largest quantity and quality of wholesome, fresh food at the lowest price of any country in the world.

Sixteen percent of disposable income goes for the purchase of food and this is achieved by only 3 percent of the population.

I submit to you that agriculture is not a single interest group. It is everybody's interest, or at least it should be. And without a strong, healthy agriculture, 25 percent of this Nation's employed work force would be unemployed and on Government dole.

The 6 million farmers and ranchers and growers would also be unemployed and their $8 billion in taxes would no longer be collected.

The support or servicing industries, such as your equipment, your fertilizer, seed, chemical sales, these type dealers also would be affected.

A strong, healthy agriculture is not only in the interest of farmers, it is or should be in the interest of every person who likes three square meals a day.

A healthy agriculture is everybody's concern and to label it a single interest group is rationale gone astray.

Benefit versus cost ratio. The farmer is in perhaps the toughest economic situation since the Depression. And it seems to me to be penny wise and pound foolish to take away one of his most valuable tools of operation.

Agricultural weather forecasting is a service that pays for itself in terms of benefits many, many times over. Many experts, in measuring the benefits versus cost ratio, go with benefits on some 750-to-1 ratio.

Now, gentlemen, there are very, very few Government dollars being spent today that return this same amount of ratio.

Looking at it in the context of billions of dollars of agricultural production that can be riding on timely weather information, $1 million a year is a small price to pay.

As I have mentioned, just one unexpected rainstorm following a pesticide application could result in losses of $1 million in the midsouth States alone.

A 1978 study indicated that timely, precise weather information meant potential savings of 16 percent of cotton production costs in Mississippi. In 1982 that amounted to nearly $57 million in savings for one crop in one State.

It is estimated by NOAA themselves that their weather forecasts save U.S. farmers at least $750 million a year in production costs of major farm commodities, and these savings translate into better profits for farmers, higher production, and lower prices for consumers.

There has been a lot of discussion about private weather service. Currently the agricultural weather service provides services with equal access to all growers. Should this service be eliminated, growers will be forced to subscribe to private weather services with fewer services and limited accessibility.

Private weather service can only be afforded by the large producer, if even they could afford it. And even then there would be no quality control standards nor uniformity of service.

Public forecasts generally are not accurate enough nor detailed enough for farmers and precise zone areas. They are difficult to convert into farming decisions and primarily cover urban areas.

It just seems wasteful and idiotic when one realizes that taxpayer dollars have been spent to build what is absolutely the world's finest weather forecasting system and now the administration wants to start dismantling it and turning it over to the private sector to sell it back to the public again when the public has already paid for it once.

It just seems shortsighted to eliminate a program that so clearly benefits the farmer and consumer as well at so little a cost.

In summary, agriculture depends upon timely, accurate, specific detailed weather information that can only be provided by NOAA and the National Weather Service. To say that private industry can assume these services immediately is ludicrous.

The cost factor to start from the ground up and reach the capabilities of providing services now assumed by Ruskin and others would be staggering to the newcomer and the fee that would have to be charged the farmer for this service would be prohibitive.

Again, just to recap just a few of the many practical uses of accurate weather information: We are using it in forest fire control, burn conditions, and disease emergency. We use it extensively in hay cutting and baling. We use it for chemical spray application and drift conditions; bee placement in groves, feeding and breeding; and labor scheduling; irrigation timing and water scheduling; packinghouse, processing, crew leader, grower coordination; heat units, threshold temperatures for integrated pest management; and, naturally, fruit frost protection.

The agricultural weather service is one of the few Federal Government services that truly works. The benefit versus cost ratio is heavily weighted in favor of benefits. Rarely does so small an investment in funding and personnel carry so large a responsibility.

The need for accurate weather information is escalating and not waning. The million dollar savings recognized by the Commerce Department by eliminating this service could be lost by Florida vegetable producers in one night alone due to the lack of freeze warning or miscalculation of time duration of minimum temperatures.

The early frost warning program costs approximately $209,000 for servicing the four States which currently utilize this service.

Again, looking at the millions of dollars in Florida alone that could be saved, the millions of dollars that are riding on timely weather information, these dollars spent are a small price to pay.

It seems a little ironic to have to go to such lengths as the agricultural industry has in order to hopefully save a program that nationwide only costs $1 million, a program that has saved the Federal Government literally hundreds of millions of dollars in tax revenue by keeping farmers in business, farm emloyees employed and consumers fed with safe, wholesome, cheap food.

It seems particularly ironic when you learn of abuses such as those given the Golden Fleece Award by Senator Proxmire, and I am sure they are only tips of the iceberg.

Agricultural weather forcasting is a srvice that pays for itself many times over in terms of benefits to the farmer and the consumer. Almost in every case it has proven that what is good for agriculture is good for all Americans, because it is the life blood of this great Nation.

We sincerely request that you do everything possible to restore funding for this much needed service. Thank you.

[The prepared statement of Mr. Emerson follows:]

STATEMENT ON THE AGRICULTURAL WEATHER SERVICES

(By Dennis E. Emerson, Assistant to the President, Florida Farm Bureau Federation)

Dear Mr. Chairman, the Florida Farm Bureau is our State's oldest, largest general farm organization with a membership of over 95,000 member families. Approximately 96 percent of all farmers and ranchers in our State are members of our organization. Our membership consists of farmers and ranchers who produce virtually every type commodity grown on a commercial basis in our State.

We are gratly concerned over the recent proposal by the Department of Commerce to eliminate agricultural weather service, fruit frost support service, aviation area forecast programs, and reduced funding for the fire weather program.

This proposal, as presented and outlined by Dr. John V. Byrne, Administrator, NOAA, and Malcolm Baldrige, Secretary of Commerce and the administration, attempts to justify this action by saying that (1) this service is serving a single interest, limited population group and should not continue at taxpayer expense, and (2) this service can be provided by the private sector.

Please allow us to address these statements, as well as express other concerns, in an effort to point out the necessity of retaining this vitally needed service.

You should understand first, however, that we wholeheartedly support reduced Government spending, balanced budget, and elimination of Federal waste and abuse of taxpayers' dollars. We supported the 20 percent reduction in USDA's 1983 budget as well as holding the line of increased commodity price support programs, etc.

We supported the 50 percent reduction in staff 2 years ago of the National Weather Service Station in Ruskin, Fla. We have supported in every case "cut-backs" when and where necessary in order to reduce Federal spending and "Federal fat." I say all this to demonstrate that we are not hypocritical in our request for retention of this service nor are we for cutting everyone else and exempting agriculture.

Cash receipts from marketing of agricultural products in Florida total more than $4 billion. Coupled with the purchase of over $8 billion in goods and services by agricultural producers and agricultural-related enterprises, agriculture becomes a rather substantial contributor to our State's economy ($12 billion). Florida agriculture employs 112,000 on-farm workers and numerous thousands of off-farm workers who actively engage in processing, packaging, retailing, etc. Close to one-fourth of Florida's work force is employed directly or indirectly by agricultural concerns. Florida ranks eleventh in the Nation in total farm cash receipts.

FLORIDA FARM FACTS

Ninety percent of the Nation's orange concentrate is grown and processed in Florida;

Florida ranks No. 1 in the Nation in production of snap beans, cabbage, tomatoes, sweet corn, cucumbers, eggplant, escarole, green peppers, watermelons, foliage plants, sugarcane, and honey; and

Florida ranks No. 2 in many, many other fruits and vegetable crops.

These facts are presented not in a boastful manner, although we are proud of their contributions, but rather to indicate the magnitude of impact upon a very, large industry who depends upon timely, accurate weather services.

The function of the National Weather Services Station in Ruskin, Fla., is vital to Florida agriculture. Its value has been demonstrated again and again as frost and freeze threatened Florida's citrus and vegetable crops. It has an even greater future role in Florida's vast farm and agribusiness structure.

We shouldn't look at the weather services as something new in agriculture. . . . In fact, the Nation's Weather Service was born and nutured under the auspices of the U.S. Department of Agriculture from 1890 to 1940.

It was during this fifty years under the Department of Agriculture that many of the basic programs were developed to support this vital industry . . . unfortunately, the Commerce Department doen't share the same degree of responsibility to our Nation's most important industry.

We in agriculture have come to depend on and rely upon timely, accurate, specialized agricultural weather information. The loss of this service will undoubtedly result in higher prices to consumers through costs of crop loss.

Some of the specific areas of uniqueness and value are in:

Forestry: The weather service station plays a key role in the protection of Florida forests (17.1 million acres) by providing information constantly on the temperature and relative humidity and other weather conditions which help gauge the danger of fires and assists the division of forestry in making preparations during fire seasons. Continuous weather mapping also assists our foresters in keeping tabs on forest insect activity and in timing the application of pesticides.

Ground link station: The Ruskin Station also is the ground link in provision of weather information gathered by satellite which is being tested by the University of Florida's Institute of Food and Agricultural Sciences in five Florida counties this year. This system is the future promise to make statewide weather information readily available through your television set. If the Ruskin Station were to be closed, the Weather Service would have no way to connect ground station weather information with the satellite data to complete the mapping project.

Fruits and vegetables: Only the National Weather Service has the capability, training and equipment to adequately supply the service necessary to help growers minimize losses due to freeze damage. Without early warning of damaging temperatures, growers could lose millions of dollars in a single night. Fred Crosby, Chief Meteorologist at Ruskin, said, "In the January 1977 freeze, the information we provided saved citrus growers in Lake and Orange Counties alone between $5-$7 million." (Lake and Orange are only two counties of approximately 25 that produce large volumes of citrus.) The December 1981 and the January 1982 freeze would even exceed these figures. It has been documented that one accurate forecast in 1978 for the freeze in Tulare County, Calif., saved $25 million worth of citrus. The California Extension Service indicates 10 percent of the value of frost sensitive crops in California are attributed to agricultural weather information. This totals to approximately $400 million worth of benefit in California alone.

Ruskin gives out special reports every 2 hours during severe weather periods, information on wind, clouds, projected low temperature hours, duration periods, etc. This timely, critical information allows growers to make their decisions.

Grower actions as a result of timely weather information: Growers make important decisions based on Ruskin reports. These decisions often save florida farmers millions of dollars per night.

(1) Strawberry producers, fern growers and other horticulturalists depend on Ruskin information to determine the exact time to turn on irrigation spray pumps or use helicopter service. This represents thousands of dollars to the grower who can wait and not turn on water before necessary, or start choppers before necessary.

(2) Citrus growers save millions by saving water, energy and manpower by waiting until the critical time to start sprinklers or turn on powerful wind machines or lighting expensive petroleum filled smudge pots.

Correct decisions mean that growers can combat the effects of adverse weather (particularly critically low temperatures). In other words, growers can reduce, or eliminate frost damage, without expensive "over-protecting" or the worst of "under-protecting" their crops.

In addition to the regular weather advisories, the Agricultural Weather Service provides information on soil temperatures, wind speed and velocity, evaporation rates, vegetative wetting, dew points, etc. Careful analysis of soil temperature and moisture measurement are needed to establish appropriate planting times. For example, corn will germinate and grow if the soil temperature is at least 55 degrees Fahrenheit at the 4-inch level when measured at 1 p.m. each day's delay in planting can mean a loss of one to four bushels per acre. Precise analysis of wind speed and direction are essential for agricultural aviation to minimize the application of costly agricultural chemicals. In this light, one unexpected rainstorm following a pesticide application could result in losses of over a million dollars in the mid-south States.

Integrated pest management programs [IPM] are just getting off the ground at the State level, and the weather data, which is an important element of such programs, will not be available if the shutdown goes through. IPM relies on various daily weather parameters in forecasting insect buildups, and other insect population dynamics.

Representative David Bowen (D.-Miss.) said recently, "That studies conducted in Mississippi indicate that farmers have been able to achieve an average of 7 percent greater cash farm receipts as a result of eliminating preventable weather losses through services provided by the NOAA Agricultural Weather Service there." We have not conducted such a study in Florida, but from experience, I would conservatively estimate the percentage would be greater than 30 percent in Florida.

STANDBY TIME FOR WORK CREWS

Many growers, packers and shippers depend upon current, accurate up-to-date weather information for lining up work crews. The commencement of work for the crews and/or the decision not to call the crews is based on weather. It is an automatic procedure by many to begin and end each day by consulting the weather forecast. Should a crew be called and due to unexpected weather they are unable to work, the grower, packer, or shipper is still liable for the standby time of the crew. This can easily amount to an unnecessary expense of thousands of dollars to the grower where crews number in the hundreds.

WATER REQUESTS

In talking with some California farmers recently they tell me they depend exclusively on their National Agricultural Weather Service's long-range forecasts for ordering water. Many have to order water four to ten days in advance, and any unanticipated rains, heat waves or frosts can easily mean they will have either to dump water or ration it. Either way, it costs the grower, but with accurate long-range weather forecasts and advisories, this risk is minimized.

In rebuttal to the proposition that this service is serving a single interest group (agriculture), I submit the reasoning that agriculture, our Nation's largest industry, our Nation's largest employer, our Nation's largest contributor to the surplus position of our international balance of payment (farm exports far exceed imports by $28 billion) and the fact that agricultural productivity allows us to have the largest quantity and quality of wholesome, fresh food at the lowest price of any country in the world (16 percent of disposable income goes for purchase of food) and this is achieved by only 3 percent of the population. Because only 3 percent are such efficient producers, this allows the other 97 percent to pursue vocations of their own interest without having to worry about from whence their food will come.

Without a strong, healthy agriculture, 25 percent of the Nation's employed work force would be unemployed and on Government dole. The 6 million farmers, ranchers and growers would also be unemployed and their $8 billion in taxes would no longer be collected. The support or servicing industries (equipment, fertilizer, seed, chemical sales and industry) are directly affected by conditions affecting agriculture.

A strong, healthy agriculture is not only in the interest of farmers; it is or should be in the interest of every person who likes three square meals a day. A healthy agriculture is everybody's concern and to label it a single interest group is rationale gone astray.

BENEFIT VERSUS COST

The farmer is in perhaps the toughest economic situation since the Depression. It seems to me, it is "penny wise and pound foolish" to take away one of his most valuable tools of operation. Agricultural weather forecasting is a service that pays for itself in terms of benefits, many times over. Many experts, in measuring the benefits versus cost ratio, go with benefits some 750-to-1 ratio.

Looking at it in the context of the billions of dollars of agricultural production that can be riding on timely weather information, a million dollars a year is a small price to pay. As I've mentioned, just one unexpected rainstorm following a pesticide application could result in losses of a million dollars in the mid-south States alone.

A 1978 study that timely weather information meant potential savings of 16 percent of cotton production costs in Mississippi. In 1982 that amounted to nearly $57 million in savings for one crop in one State. It is estimated by NOAA themselves, that their weather forecasts save U.S. farmers at least $750 million a year in production costs of major farm commodities. These savings translate into better profits for farmers, higher production and lower prices for consumers.

PRIVATE WEATHER SERVICE

Currently, the Agricultural Weather Service provides services with equal access to all growers. Should this service be eliminated, growers will be forced to subscribe to private weather services with fewer services and limited accessibility.

Private weather service could only be afforded by the larger producer—if even they could afford it—and, even then, there would be no quality control standards, nor uniformity of service. Public forecasts generally are not accurate nor detailed enough for farmers; they are difficult to convert into farming decisions and primarily cover urban areas.

It just seems wasteful and idiotic when one realizes that taxpayer dollars have been spent to build what is absolutely the world's first weather forecasting system and now the administration wants to start dismantling it and turning it over to the private sector to sell it back to the public, when the public has already paid for it once.

It just seems shortsighted to eliminate a program that so clearly benefits the farmer and consumer as well at so little a cost.

In summary, agriculture depends upon timely, accurate, detailed weather information that can only be provided by NOAA and the National Weather Service. To say that private industry can assume these services immediately is ludicrous. The cost factor to start from the ground up and reach the capabilities and provide services now assumed by Ruskin and others would be staggering to the newcomer and the fee that would have to be charged the farmer for this service would be prohibitive.

Again, to recap just a few of the many practical uses of accurate agricultural weather information:

Forestry fire control, burn conditions and disease emergence; hay cutting and baling; chemical spray application and drift conditions; bee placement in groves, feeding and breeding; labor scheduling; irrigation timing and water scheduling; packinghouse, processor, crew leader, grower coordination heat units, threshold temperatures for integrated pest management; and naturally, fruit frost protection.

The Agricultural Weather Service is one of the few Federal Government services that truly works. The benefit versus cost ratio is heavily weighted in favor of benefits.

Rarely does so small an investment in funding and personnel carry so large a responsibility. The need in accurate weather information is escalating and not waning. The $1 million savings recognized by the Commerce Department by eliminating the agricultural weather station, could be lost by Florida vegetable producers in one night alone due to the lack of freeze warning or miscalculation of time duration of minimum temperatures. The early frost warning program costs approximately $209,000 for servicing the four states which currently utilize this service. Again, looking at the millions of dollars in Florida alone that can be riding on timely weather information, these dollars spent are a small price to pay.

It seems a little ironic to go to such lengths as the agricutural industry has in order to, hopefully, save a program that nationwide only costs $1 million; a program that has saved the Federal Government literally hundreds of millions in tax revenue by keeping farmers in business, farm employees employed, and consumers fed with safe, wholesome, cheap food. It seems particularly ironic when you learn of abuses, such as those given the "Golden Fleece" Award by Senator Proxmire and I'm sure those are only tips of the iceburg.

Agricultural weather forecasting is a service that pays for itself many times over in terms of benefits to the farmer and the consumer. Almost in every case it's proven that what's good for agricuture is good for all Americans, because it is the lifeblood of this great Nation.

We sincerely request you do everything possible to restore funding for this much needed service.

Mr. **Lewis**. Thank you, Mr. Emerson. Your testimony took considerably longer than 10 minutes, but because it was so much on target I felt it was necessary to get it in the record for you and for the members of the committee to hear it. Now I would like to ask the remaining members of the panel again to summarize their findings.

The written testimony will be included in the record; therefore, just summarize and avoid repeating to any extent those points Mr. Emerson has already discussed.

Mr. **Teets**. Congressman Lewis, if you would like—my name is Frank Teets; I am currently President of the Florida Fruit and Vegetable Association, and General Manager of the South Bay Growers, Inc., a large producer in South Palm Beach County. My statement will be in the record. If you would like I will defer and answer any questions you may have.

Mr. **Lewis**. No. I want you to go ahead and summarize it, Mr. Teets, and the other gentlemen; I do not want to cut you off.

Mr. **Teets**. OK. Fine. This statement is presented on behalf of the membership of the Florida Fruit and Vegetable Association, an agricultural trade association with substantial membership among those who produce and market fresh vegetables, tropical fruits, and sugar from sugar cane, with some membership among citrus interests.

The question of maintainng frost warning service at the stations in Ruskin, Fla. has been a subject of special concern to the fresh fruit and vegetable industry of Florida for quite some time.

The administration originally moved to terminate the frost warning service in 1981. However, after the significance of the service was explained, approval was granted to continue it until the end of fiscal year 1982 at half staff.

In 1982 further consideration was given to termination of the service, but again sufficient funding was included in the budget to cover the service at Ruskin at half staff.

Benefits of agricultural weather forecasting by the Ruskin Weather Station are extremely important to a grower's total farming operations.

Perhaps there is no greater fear or concern to a grower than the weather. He must have knoweledge of the weather in order to make proper decisions about his crop culture and harvesting, as well as protection to the extent possible when abnormal conditions are forecast.

Throughout the State growers rely on the Ruskin Station forecasts through local radio stations on NOAA outlets. Most growers have special radios in their trucks or offices that give only NOAA weather information prepared by Ruskin.

Services provided to Florida agriculture by the Ruskin Weather Station ranks high on the benefit list of Government services.

Dissemination of information is available to the industry in a variety of ways from the Ruskin Station. Weekly weather summaries are published at the national and State levels and are available by subscription.

The daily forecast products and special issuances are available over NOAA weather wire, teletype circuit, The various NOAA weather radios in Florida, several of IFAS's Cooperative Extension Service offices at the county level, and via telephone.

It is doubtful that weather forecasting comparable to the service provided by Ruskin could be obtained in any other fashion.

To the best of our knowledge there is presently no comparable service available to the Florida agriculture.

In our opinion problems and difficulties that would be encountered without the Ruskin weather forecasting service would add greatly to the cost of good production, signficantly increasing the substantial economic handicaps under which the Florida grower is already having to operate.

We recognize, of course, that there are numerous private weather forecast services available on a subscription basis for anyone requiring weather information in the normal operation of business.

It so happens that on March 23-24, 1983 the National Climate program Office of NOAA has a conference in Tallahassee for the purpose of discussing and evaluating climate service needs and capabilities for meeting those needs from the public and private sectors.

James T. Duncan, executive vice president and general manager of FFVA was requested to prevent to this conference information about the climate and weather data and information needs of FFVA.

Much of the detailed information asked for in your letter to me requesting my appearance at this hearing is contained in the report presented to the conference held at Florida State University in Tallahassee last week.

In the interest of expediting preparation and details of the statement, I am taking the liberty of attaching a copy of the association's report which was presented at the Tallashassee conference, in page 5 thourhg 9.

In Mr. Duncan's report reference is made to the fact that the Department of Commerce budget recommendation for fiscal year 1984 suggests that the agricultural weather, fruit frost, and aviation area forecast programs are proposed for termination, and the fire weather program is proposed for reduction.

Prior to this presentation Dr. Joe Friday, Acting Deputy Assistant Administrator, National Weather Service, alluded to this point and in response to questions from Mr. Duncan about whether there was any flexibility in the Department's budgetary recommendations about termination of the agricultural weather service, Dr. Friday responded that there was none.

I also understand from Mr. Duncan that it was the general consensus at this conference, which is made up of specialists from weather services throughout the country, that provision of adequate climate and weather data and information needs could be made available only by the continued joint efforts of the public and private sectors.

The problems and difficulties that would be encountered should the Ruskin Weather Station be terminated are numerous and costly. It is doubtful that commercial weather services could provide comparable service at reasonable cost.

We believe it would be a serious mistake and add greatly to the cost of food production if agriculture weather forecasting services were terminated at Ruskin, Fla. Therefore, on behalf of the members of the Florida Fruit and Vegetable Association, and for all of agriculture, I urgently request that funding be continued for the half-staff service fore the Ruskin, Fla. Station.

Thank you.

[The prepared statement of Mr. Teets follows:]

REPORT OF FRANK D. TEETS
PRESIDENT
FLORIDA FRUIT & VEGETABLE ASSOCIATION
FOR
SUBCOMMITTEE ON NATURAL RESOURCES,
AGRICULTURE RESEARCH & ENVIRONMENT
U. S. HOUSE OF REPRESENTATIVES
AT
WEST PALM BEACH
MARCH 31, 1983

MY NAME IS FRANK D. TEETS, PRESIDENT OF FLORIDA FRUIT & VEGETABLE ASSOCIATION, WITH HEADQUARTERS AT 4401 EAST COLONIAL DRIVE, POST OFFICE BOX 20155, ORLANDO, FLORIDA 32814.

I AM ALSO VICE PRESIDENT OF U. S. SUGAR CORPORATION, CLEWISTON, FLORIDA, IN CHARGE OF VEGETABLE OPERATIONS. IN THIS CONNECTION, I SERVE AS GENERAL MANAGER OF SOUTH BAY GROWERS, INC. WITH HEADQUARTERS IN SOUTH BAY, FLORIDA.

THIS STATEMENT IS PRESENTED ON BEHALF OF THE MEMBERSHIP OF THE FLORIDA FRUIT & VEGETABLE ASSOCIATION, AN AGRICULTURAL TRADE ASSOCIATION WITH SUBSTANTIAL MEMBERSHIP AMONG THOSE WHO PRODUCE AND MARKET FRESH VEGETABLES, TROPICAL FRUITS AND SUGAR FROM SUGAR CANE, WITH SOME MEMBERSHIP AMONG CITRUS INTERESTS.

THE QUESTION OF MAINTAINING FROST WARNING SERVICE AT THE STATION IN RUSKIN, FLORIDA HAS BEEN A SUBJECT OF SPECIAL CONCERN TO THE FRESH FRUIT AND VEGETABLE INDUSTRY OF FLORIDA FOR QUITE SOME TIME. THE ADMINISTRATION ORIGINALLY MOVED TO TERMINATE THE FROST WARNING SERVICE IN 1981. HOWEVER, AFTER THE SIGNIFICANCE OF THIS SERVICE WAS EXPLAINED, APPROVAL WAS GRANTED TO CONTINUE IT UNTIL THE END OF FISCAL YEAR 1982 AT HALF-STAFF. IN 1982, FURTHER CONSIDERATION WAS GIVEN TO TERMINATION OF THE SERVICE BUT AGAIN SUFFICIENT FUNDING

WAS INCLUDED IN THE BUDGET TO COVER THE SERVICE AT RUSKIN AT HALF-STAFF.

BENEFITS OF AGRICULTURAL WEATHER FORECASTING BY THE RUSKIN WEATHER STATION ARE EXTREMELY IMPORTANT TO A GROWER'S TOTAL FARMING OPERATIONS. PERHAPS THERE IS NO GREATER FEAR OR CONCERN TO A GROWER THAN THE WEATHER. HE MUST HAVE KNOWLEDGE OF THE WEATHER IN ORDER TO MAKE PROPER DECISIONS ABOUT HIS CROP CULTURE AND HARVESTING, AS WELL AS PROTECTION TO THE EXTENT POSSIBLE WHEN ABNORMAL CONDITIONS ARE FORECAST. THROUGHOUT THE STATE, GROWERS RELY ON THE RUSKIN STATION FORECASTS THROUGH LOCAL RADIO STATIONS ON NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION OUTLETS. MOST GROWERS HAVE SPECIAL RADIOS IN THEIR TRUCKS OR OFFICES THAT GIVE ONLY NOAA WEATHER INFORMATION PREPARED BY RUSKIN. SERVICE PROVIDED TO FLORIDA AGRICULTURE BY THE RUSKIN WEATHER STATION RANKS HIGH ON THE BENEFIT LIST OF GOVERNMENT SERVICES.

DISSEMINATION OF INFORMATION IS AVAILABLE TO THE INDUSTRY IN A VARIETY OF WAYS FROM THE RUSKIN STATION. WEEKLY WEATHER SUMMARIES ARE PUBLISHED AT THE NATIONAL AND STATE LEVELS AND ARE AVAILABLE BY SUBSCRIPTION. THE DAILY FORECAST PRODUCTS AND SPECIAL ISSUANCES ARE AVAILABLE OVER NOAA WEATHER WIRE (TELETYPE CIRCUIT), THE VARIOUS NOAA WEATHER RADIOS IN FLORIDA, SEVERAL OF IFAS'S COOPERATIVE EXTENSION SERVICE OFFICES AT THE COUNTY LEVEL, AND VIA TELEPHONE.

IT IS DOUBTFUL THAT WEATHER FORECASTING COMPARABLE TO THE SERVICE PROVIDED BY RUSKIN COULD BE OBTAINED IN ANY OTHER FASHION. TO THE BEST OF OUR KNOWLEDGE, THERE IS PRESENTLY NO COMPARABLE SERVICE AVAILABLE TO FLORIDA AGRICULTURE. IN OUR OPINION, PROBLEMS and difficulties that would be encountered without the Ruskin Weather Forecast Service would add greatly to the cost of food production, significantly increasing the substantial economic handicaps under which the Florida grower already is having to operate.

We recognize, of course, that there are numerous private weather forecast services available on a subscription basis for anyone requiring weather information in the normal operation of business.

It so happened that on March 23-24, 1983, the National Climate Program office of NOAA had a conference in Tallahassee for the purpose of discussing and evaluating climate service needs and capabilities for meeting those needs from the public and private sectors. James T. Duncan, Executive Vice President and General Manager of the Florida Fruit & Vegetable Association was requested to present to this conference information about the climate and weather data and information needs of FFVA. Much of the detailed information asked for in your letter to me requesting my appearance at this hearing is contained in the report presented to the conference held at Florida State University in Tallahassee last week. In the interest of expediting preparation and details of the statement, I am taking the liberty of attaching a copy of the Association's report which was presented at the Tallahassee conference. (Pages 5-9).

In Mr. Duncan's report (pages 4 & 5), reference was made to the fact that the Department of Commerce Budget recommendation for

FISCAL YEAR 1984 SUGGESTS THAT "THE AGRICULTURAL WEATHER, FRUIT FROST, AND AVIATION AREA FORECAST PROGRAMS ARE PROPOSED FOR TERMINATION, AND THE FIRE WEATHER PROGRAM IS PROPOSED FOR REDUCTION."

PRIOR TO THIS PRESENTATION, DR. JOE FRIDAY, ACTING DEPUTY ASSISTANT ADMINISTRATOR, NATIONAL WEATHER SERVICE, ALLUDED TO THIS POINT AND IN RESPONSE TO A QUESTION TO MR. DUNCAN ABOUT WHETHER THERE WAS ANY FLEXIBILITY IN THE DEPARTMENT'S BUDGETARY RECOMMENDATIONS ABOUT TERMINATION OF AGRICULTURE WEATHER SERVICE, DR. FRIDAY RESPONDED THAT THERE WAS NONE.

I ALSO UNDERSTAND FROM JIMMY DUNCAN THAT IT WAS THE GENERAL CONSENSUS AT THIS CONFERENCE, WHICH WAS MADE UP OF SPECIALISTS FROM WEATHER SERVICES THROUGHOUT THE COUNTRY, THAT PROVISION OF ADEQUATE CLIMATE AND WEATHER DATA AND INFORMATION NEEDS COULD BE MADE AVAILABLE ONLY BY THE CONTINUED JOINT EFFORTS OF THE PUBLIC AND PRIVATE SECTORS.

THE PROBLEMS AND DIFFICULTIES THAT WOULD BE ENCOUNTERED SHOULD THE RUSKIN WEATHER STATION BE TERMINATED ARE NUMEROUS AND WOULD BE COSTLY. IT IS DOUBTFUL THAT COMMERCIAL WEATHER SERVICES COULD PROVIDE COMPARABLE SERVICES AT REASONABLE COSTS.

WE BELIEVE IT WOULD BE A SERIOUS MISTAKE AND ADD GREATLY TO THE COST OF FOOD PRODUCTION IF AGRICULTURE WEATHER FORECASTING SERVICES WERE TERMINATED AT RUSKIN, FLORIDA. THEREFORE, ON BEHALF OF THE MEMBERS OF FLORIDA FRUIT & VEGETABLE ASSOCIATION, AND FOR ALL OF AGRICULTURE, I URGENTLY REQUEST THAT FUNDING BE CONTINUED FOR THE HALF-STAFF SERVICE FOR THE RUSKIN, FLORIDA STATION.

REPORT OF JAMES T. DUNCAN
EXECUTIVE VICE PRESIDENT & GENERAL MANAGER
FLORIDA FRUIT & VEGETABLE ASSOCIATION

FOR
COOPERATIVE CLIMATE SERVICES CONFERENCE AND WORKSHOP
AT
FLORIDA STATE UNIVERSITY
TALLAHASSEE, FLORIDA
MARCH 22-24, 1983

ONE HUNDRED AND TWENTY MILES OF RADISHES -- THIS IS WHAT ONE LARGE FLORIDA FARMING OPERATION HARVESTS MOST EVERY DAY FROM OCTOBER TO MAY. (THAT'S A LOT OF BURPS!) AGRICULTURE IN FLORIDA IS BIG BUSINESS.

CASH RECEIPTS FROM MARKETING FLORIDA'S AGRICULTURAL PRODUCTS IN 1981 TOTALED OVER $4 BILLION. FLORIDA RANKED 12TH IN THE NATION IN TOTAL CASH RECEIPTS FROM FARM MARKETING. IN 1981, FLORIDA'S CASH RECEIPTS WERE:

CITRUS - 31%	$1,240,000,000.
LIVESTOCK AND PRODUCTS - 25%	1,000,000,000.
VEGETABLES AND MELONS - 20%	800,000,000.
MISCELLANEOUS CROPS - 13%	520,000,000.
FIELD CROPS - 11%	440,000,000.

FLORIDA'S DIVERSE AGRICULTURAL INDUSTRY IS AN IMPORTANT ELEMENT IN THE STATE'S OVERALL ECONOMY WITH 39 PERCENT OF FLORIDA'S TOTAL LAND AREA DEVOTED TO FARMING OPERATIONS.

IF YOU COUPLE ALL THE RELATED AGRI-BUSINESS SUPPORT DOLLARS TO THE CASH RECEIPTS DOLLARS, YOU CAN CLEARLY SEE THAT FLORIDA HAS A MULTI-BILLION DOLLAR FARM ECONOMY, AN ECONOMY THAT HAS ALL THE SIGNS

OF A HEALTHY GROWTH PROVIDED, OF COURSE, THE WEATHER COOPERATES AND BEHAVES IN ITS NORMAL UNPREDICTABLE MANNER.

LET'S TAKE A LOOK AT OUR STATE'S FARMING SEASONS IN RELATION TO OUR WEATHER AND CLIMATE. FLORIDA'S GEOGRAPHICAL SITUATION, SURROUNDED ON THREE SIDES BY WATER, AND HAVING A VERY LOW ELEVATION, MAKES FOR A WARM-HUMID CLIMATE WITH A NORMALLY HIGH RAINFALL. OF COURSE, THE CLIMATE HAS A DECIDED INFLUENCE ON WHERE, WHEN, AND HOW CROPS ARE PRODUCED IN THE FALL, WINTER, AND SPRING SEASONS. THE HOT AND RAINY (HUMID) MONTHS OF JULY, AUGUST, AND SEPTEMBER ARE DEVOTED TO LAND PREPARATION AND PLANTING OF CROPS FOR THE FALL SHIPPING PERIOD. SUMMER RAINS ARE ADVANTAGEOUS TO THE CITRUS CROP AND TO RECHARGE SURFACE AND GROUNDWATER RESERVOIRS WHICH WILL BE TAPPED FOR CROP IRRIGATION DURING PRODUCTION MONTHS. THIS YEAR WE CAN ADD FALL AND WINTER RAINS TO THE RECHARGE CYCLE. IN LAYMAN'S LANGUAGE, WE ARE JUST ABOUT OVER RECHARGED.

CLIMATE, TOO, PLAYS A BIG PART IN DETERMINING WHERE IN FLORIDA PARTICULAR CROPS ARE CONCENTRATED; FOR EXAMPLE: CITRUS GROVES APPEAR IN 41 OF 67 COUNTIES WITH THE CENTRAL COUNTIES DEVOTED PREDOMINANTLY TO CITRUS. IN RECENT YEARS, AS THE RESULT OF TREE DAMAGING FREEZES, NEW CITRUS ACREAGE IS MOVING SOUTHWARD. ACTUALLY, THE CITRUS INDUSTRY GOT ITS START MUCH FARTHER NORTH, AROUND JACKSONVILLE, BUT COLD WEATHER HAS CAUSED A CONTINUED TREND TOWARD WARMER LOCATIONS.

IN VEGETABLE CROPS, FALL PRODUCTION BEGINS IN THE CENTRAL AREA AND MIGRATES SOUTHWARD IN ORDER FOR THE TENDER CROPS TO ESCAPE THE POSSIBILITY OF COLD WEATHER IN THE MONTHS OF DECEMBER, JANUARY, AND FEBRUARY. THEN AS THE WARM SPRING MONTHS APPROACH, CROP MIGRATION MOVES NORTH AGAIN.

THE NEEDS FOR CLIMATE AND WEATHER DATA ARE AS VARIED AND DIVERSE WITHIN FLORIDA'S FRUIT AND VEGETABLE INDUSTRIES AS THE INDUSTRIES THEMSELVES ARE VARIED AND DIVERSE. EACH INDUSTRY HAS ITS OWN PRODUCTION CYCLE AND ITS OWN PARTICULAR NEEDS FOR INFORMATION, AS GROWERS MAKE DECISIONS AFFECTING THE PLANTING, CULTURE AND HARVESTING OF CROPS; NEEDS THAT ARE DETERMINED BY TYPE AND VARIETY OF CROP, GEOGRAPHICAL LOCATION, AND OTHER FACTORS.

THUS A CONFERENCE SUCH AS THIS IS VERY TIMELY. THE OPENING SENTENCE OF MR. HECHT'S LETTER TO ME LAST DECEMBER SAID; "WE INVITE YOU TO PARTICIPATE IN A CONFERENCE TO EVALUATE OPTIONS FOR PUBLIC/PRIVATE COOPERATION IN PROVIDING REGIONAL, STATE, AND LOCAL CLIMATE SERVICES." THEN, FOLLOWING A VERY INTERESTING SUMMARY ABOUT RECOMMENDATIONS PROVIDED BY THE NAS CLIMATE BOARD'S PANEL ON INTERGOVERNMENTAL CLIMATE PROGRAMS IN THEIR RECENT REPORT, "MEETING THE CHALLENGE OF CLIMATE" AND COMMENTS ABOUT WHAT HAS BEEN DONE ALREADY IN CONNECTION WITH THOSE SUGGESTIONS, MR. HECHT SAID; "WE WOULD LIKE TO HEAR FROM YOU ON THE CLIMATE AND WEATHER DATA AND INFORMATION NEEDS OF FLORIDA FRUIT AND VEGETABLE GROWERS. WE WOULD ALSO BE INTERESTED IN THE RELATIVE IMPORTANCE TO AGRICULTURAL USERS OF REAL-TIME, NEAR REAL-TIME AND HISTORIC CLIMATE DATA AND INFORMATION." THEN, HE SAID, YOU HAVE TWENTY MINUTES. (I'M NOT SURE TO WHICH OF THE THREE SUGGESTIONS I SHOULD PAY THE MOST ATTENTION - I QUESTION THAT THE THREE ARE COMPATIBLE - SO, I SHALL PROCEED ON THE BASIS THAT I WAS BEING GIVEN FRIENDLY ADVICE ABOUT HOW TO FULFILL MY OBLIGATIONS FOR THIS ASSIGNMENT, WHICH LITERALLY INTERPRETED MEANS 'DO AS YOU PLEASE.'

SO MUCH HAS HAPPENED WITHIN THE LAST COUPLE OF YEARS AFFECTING OUR WEATHER REPORTING SERVICES. ON THE ONE HAND, WE TALK ABOUT THE FACT THAT A GOOD DEAL MORE NEEDS TO BE DONE TO ACHIEVE A NATIONWIDE SYSTEM OF CLIMATE SERVICES:

THAT NOAA'S ROLES, CAPABILITIES, AND PLANS FOR PROVIDING CLIMATE SERVICES MUST BE UNDERSTOOD AS A FIRST STEP IN PROGRAM COORDINATION.

THAT THE USDA ROLE IN EDUCATION AND DELIVERY OF CLIMATE SERVICES MUST BE CLARIFIED.

THAT THE POTENTIAL AND LIMITATIONS OF STATE CLIMATOLOGISTS FOR PROVIDING CLIMATE SERVICES AND THE OPTION OF REGIONAL CLIMATE ACTIVITIES NEED TO BE EVALUATED.

AND, THAT WAYS OF INTEGRATING PUBLIC AND PRIVATE CLIMATE SERVICES SHOULD BE RECOMMENDED.

ON THE OTHER HAND, I NOTE FROM THE DEPARTMENT OF COMMERCE BUDGET RECOMMENDATION FOR FISCAL YEAR 1984 THAT "THE AGRICULTURAL WEATHER, FRUIT FROST, AND AVIATION AREA FORECAST PROGRAMS ARE PROPOSED FOR TERMINATION, AND THE FIRE WEATHER PROGRAM IS PROPOSED FOR REDUCTION." I SUSPECT THAT THIS CONFERENCE DOES NOT INTEND TO DEAL WITH THE POLITICAL ASPECTS OF THE SITUATION, BUT I SUGGEST THAT IF THAT BUDGET RECOMMENDATION IS APPROVED BY THE CONGRESS, THAT THE PURPOSE OF THIS CONFERENCE TAKES ON AN ENTIRELY NEW DIRECTION. I BELIEVE IN BEING REALISTIC. HOWEVER, I WILL STATE PUBLICLY TO THIS CONFERENCE THAT THE FLORIDA FRUIT & VEGETABLE ASSOCIATION, AND I AM SURE MANY OTHER AGRICULTURAL GROUPS AS WELL, WILL DO EVERYTHING POSSIBLE TO ASSURE THE CONTINUATION OF THE AGRICULTURAL WEATHER FORECAST AND ADVISORY SERVICE AT RUSKIN, FLORIDA, UNTIL WE ARE CONVINCED THERE IS A BETTER WAY TO DO THE JOB.

I BELIEVE WE HAVE REPRESENTATIVES FROM THE DEPARTMENT OF COMMERCE AND FROM USDA AT THIS CONFERENCE. I WOULD HOPE THAT PEOPLE IN BOTH COMMERCE AND USDA WOULD DO WHATEVER THEY CAN TO SEE THAT THE KIND OF INFORMATION THE PRODUCER NEEDS TO ENABLE HIM TO BE EFFICIENT AND COMPETITIVE IN THE MARKETPLACE IS READILY AVAILABLE AT ALL TIMES. IT SEEMS TO ME THIS IS IN THE PUBLIC INTEREST AS WELL AS IN THE INTEREST OF AGRICULTURE. IF THAT TYPE OF PROGRAM IS NOT TO BE CONTINUED, THEN I SUGGEST THE AGENDA OF THIS CONFERENCE SHOULD BE CHANGED TO DEAL WITH JUST HOW THIS INFORMATION IS GOING TO BE AVAILABLE IN THE FUTURE.

UPON THE PRESUMPTION THAT AGRICULTURE'S EFFORTS TO PRESERVE THE SERVICE WILL BE SUCCESSFUL AND THAT WE WILL HAVE THE SUPPORT OF COMMERCE AND AGRICULTURE IN THIS ENDEAVOR, I WILL GET ON WITH MY ASSIGNMENT; (HOWEVER, PREVIOUS REPORTS INDICATE LITTLE POSSIBILITY FOR SUCH SUPPORT.)

IN FLORIDA AGRICULTURE, WE HAVE SEVERAL BASIC NEEDS FOR CLIMATE AND WEATHER DATA AND INFORMATION.

IN THE INTEREST OF SIMPLIFICATION FOR ME IN PREPARING THIS REPORT, I SHALL INTEGRATE (IF YOU PLEASE) COMMENTS CONCERNING CLIMATE AND WEATHER DATA AND INFORMATION NEEDS. I WILL LEAVE IT TO THE LEARNED INDIVIDUALS IN THE FIELD OF WEATHER TO MAKE WHATEVER SEPARATIONS ARE CONSIDERED NECESSARY OR DESIRABLE. WHEN WE TALK ABOUT THE WEATHER ON THE FARM, WE TEND TO MAKE IT ONE SUBJECT AND DEAL WITH ALL ASPECTS AS ONE SUBJECT.

FIRST, LET'S DEAL WITH RAINFALL:

TODAY AND EVERY DAY THE GROWER NEEDS TO KNOW JUST AS MUCH AS POSSIBLE ABOUT RAINFALL YESTERDAY, TODAY AND TOMORROW. AND, WHEN

I SAY GROWER, I MEAN THE MAN AND/OR COMPANY WHO PRODUCES, MARKETS AND DELIVERS. IT IS UNDERSTOOD, OF COURSE, THAT IN MANY INSTANCES THIS MIGHT CONSTITUTE TWO OR THREE OR MORE DISTINCT AND SEPARATE OPERATIONS.

SOME OF THAT NEED IS CLIMATE DATA AND SOME OF IT IS WEATHER INFORMATION. WE NEED TO KNOW THE PAST RAINFALL RECORD AND VARIATION IN RAINFALL FROM DRY TO WET YEARS. THIS WE PUT IN THE CRYSTAL BALL FOR LONG-RANGE PLANNING. FOR IMMEDIATE USE, WE ALSO NEED TO KNOW THE EVAPOTRANSPIRATION AND EVAPORATION POSSIBILITIES OF WATER FROM THE FIELDS; WITH THIS INFORMATION AND KNOWLEDGE OF HOW MUCH IT RAINED YESTERDAY AND HOW MUCH IS EXPECTED TOMORROW, WE CAN DETERMINE WHETHER TO IRRIGATE AND WHETHER TO SEND HARVESTING CREWS TO THE FIELD. HISTORICAL INFORMATION OF THIS TYPE IS ESSENTIAL FOR DECISION MAKING ABOUT WHETHER AN IRRIGATION SYSTEM IS NEEDED AND IF SO THE TYPE THAT WOULD BE MOST EFFICIENT. ALSO, SUCH DATA IS IMPORTANT FOR DETERMINING THE RIGHT VARIETY TO PLANT IN TERMS OF DROUGHT HARDINESS AND IRRIGATION REQUIREMENTS. ACTUALLY, IN DAY TO DAY OPERATIONS, IT IS A CONTINUOUS CONSOLIDATION OF WEATHER DATA AND CURRENT WEATHER INFORMATION IN THE DECISION MAKING PROCESS. SHOULD WE LOWER WATER TABLES IN CANALS AND FIELDS? SHOULD WE IRRIGATE? SHOULD WE MAKE PESTICIDE APPLICATIONS? WHAT TO DO ABOUT IPM (INTEGRATED PEST MANAGEMENT) PROGRAMS FOR DISEASE AND INSECT FORECASTING.

THESE COMMENTS, OF COURSE, POINT TO JUST A FEW OF THE INFORMATIONAL AND HISTORICAL DATA NEEDS RELATED TO RAINFALL, BUT LET US GET ON WITH SOME OTHER WEATHER SUBJECTS AS THEY RELATE TO FLORIDA AGRICULTURE.

TEMPERATURE - HIGH, LOW AND AVERAGE TEMPERATURE BOTH WET AND DRY BULB ESSENTIAL.

ALSO TEMPERATURE INFORMATION HIGHLY IMPORTANT IN PREDICTIONS OF PEST OUTBREAKS UNDER IPM PROGRAMS.

PRODUCTION - NEEDED IN SCHEDULING PLANTING AND HARVEST. DAYS TO HARVEST VARY DUE TO TEMPERATURE. PLANTING, HARVESTING AND HANDLING TIMING AND PROCEDURES WILL ALSO BE AFFECTED BY TEMPERATURE.

COLD PROTECTION - CULTIVATION, HARVEST AND IRRIGATION MUST BE ALTERED WELL IN ADVANCE OF FROST OR FREEZE. DURATION OF POSSIBLE FROST CONDITIONS AS WELL AS TEMPERATURE LOWS ARE NEEDED. CLOUD MOVEMENT, WIND OR CALMS ARE ALSO IMPORTANT IN FROST OR FREEZE OUTLOOKS.

WIND - VELOCITY, DURATION AND DIRECTION ARE NEEDED. AND IN CONNECTION WITH IPM - NEEDED FOR INSECT AND DISEASE MOVEMENT LOCALLY AND BETWEEN AREAS. APPLICATION OF PESTICIDES MUST BE ALTERED DUE TO COVERAGE AND DRIFT.

PRODUCTION - FIELD PREPARATION, PLANTING, TRANSPLANTING, ARE STOPPED AND PROTECTION OF YOUNG PLANTS IS ESSENTIAL IN TIMES OF HIGH WINDS. WINDS CAN ALSO SCAR FRUIT AND DESICATE LEAVES, THUS, PRECAUTIONS MUST BE TAKEN AGAINST THIS HAPPENING.

RAPID COMMUNICATION OF THE CURRENT TEMPERATURE SITUATION IS NEEDED WHEN A FREEZE IS LIKELY, INCLUDING PROJECTING THE LOW TEMPERATURE AND THE NUMBER OF HOURS IT IS LIKELY TO BE BELOW FREEZING, BELOW 28, 22, ETC. ALSO, IT IS IMPORTANT TO KNOW LONG-RANGE FORECASTS, AS WELL AS SHORT-RANGE, ONE TO THREE DAYS; WITH 8 OR 10 HOUR FORECASTS VERY IMPORTANT WHEN EXTREMES ARE ANTICIPATED. THREE-DAY FORECASTS ALLOW ENOUGH TIME FOR EXTENSIVE FLOODING; WHILE EIGHT HOURS HELP IF HEATING, WIND MACHINES OR UNDERTREE IRRIGATION

ARE TO BE USED. OF COURSE, FOLLOWING A FREEZE, IT IS NICE TO KNOW HOW COLD IT GOT, PARTICULARLY THE NUMBER OF CHILLING HOURS PLANTS RECEIVED IN PARTICULAR LOCATIONS.

ALSO, IN CONNECTION WITH TEMPERATURE AND WIND INFORMATION, WE NEED CURRENT AND HISTORICAL INFORMATION ABOUT FROST PROBABILITY BECAUSE MOST FLORIDA CROPS ARE SUSCEPTIBLE TO FROST DAMAGE; AND, KNOWLEDGE OF INVERSIONS AND WINDS ARE IMPORTANT, PARTICULARLY DURING PESTICIDE APPLICATIONS AND AT TIMES OF AGRICULTURAL BURNINGS.

WE MUST DEAL, TOO, WITH:

DEW POINT AND DURATION OF WETNESS - NEEDED FOR BOTH HARVESTING SCHEDULING AND DISEASE CONTROL.

HUMIDITY - NEEDED FOR IPM WORK.

CATASTROPHIC EVENTS - HURRICANE, STORMS, HAIL. NO EXPLANATION NEEDED.

I SHOULD ADD, TOO, A COUPLE OF POINTS ABOUT WHICH I KNOW LITTLE BUT ABOUT WHICH I HAVE HEARD DISCUSSIONS.

(1) THE AVAILABILITY OF COMPUTER ENHANCED RADAR SWEEPS FOLLOWING FRONTS MOVING INTO AN AREA; AND

(2) A MORE DEFINED AREA IN SATELITE FREEZE FORECAST SYSTEMS.

WHEN YOU STOP AND MAKE A CAREFUL OR DETAILED SEARCH FOR INFORMATION THAT THE FLORIDA FARMER NEEDS TO OPERATE SUCCESSFULLY, IT IS DIFFICULT TO FIND A STOPPING PLACE. SOMEONE HANDED ME A MEMORANDUM THAT I THOUGHT PRETTY WELL SUMMARIZED THE SITUATION. I WOULD LIKE TO SHARE IT WITH YOU AND GIVE CREDIT TO WHOMEVER PASSED IT TO ME; I.E. -

"EXAMPLES OF NEEDS"

SHORT RANGE (1 TO 3 DAYS)

ACCURATE AND TIMELY FREEZE AND FROST WARNINGS ARE NEEDED TO MAXIMIZE THE EFFECTIVENESS OF OUR COLD PROTECTION SYSTEMS AND PRACTICES - BOTH ACTIVE AND PASSIVE.

PRECIPITATION AND WIND FORECASTS ARE ESSENTIAL TO THE SUCCESS OF OUR EXTENSIVE SPRAY PROGRAMS.

INTERMEDIATE RANGE (3 TO 10 DAYS)

NEED THE BEST POST FREEZE PROJECTIONS OF WEATHER (PARTICULARLY TEMPERATURE AND PRECIPITATION) TO EFFICIENTLY MANAGE REPLANTING AND/OR SALVAGE OPERATIONS.

NEED PRECIPITATION PROJECTIONS FOR EFFECTIVE SOIL FUMIGATION PROGRAMS.

LONG RANGE (MORE THAN 10 DAYS)

NEED A BLEND OF CLIMATOLOGICAL PROBABILITIES AND SYNOPTIC DATA TO MAKE JUDGEMENTS ON SUCH THINGS AS REMOVAL OF BANKS FROM YOUNG TREES.

NEEDED FOR LATE WINTER AND EARLY SPRING PLANTINGS OF VEGETABLE CROPS.

AND, IN SPEAKING OF NOT KNOWING WHERE TO STOP, I SHOULD MENTION THAT NOTHING HAS BEEN SAID ABOUT OTHER KINDS OF INFORMATION NEEDS THAT COME TO MIND LIKE CLOUD LOCATION, LIGHTNING PROBABILITY, GROWING DEGREE DAYS. ETC.

AND, WHY SHOULD WE BE SO INTERESTED IN THE AVAILABILITY OF THIS INFORMATION? SIMPLE, AN EVER INCREASING POPULATION IN THE UNITED STATES AND IN THE WORLD MUST BE FED AND IN THIS COUNTRY AS YOU KNOW THAT POPULATION IS ALMOST TOTALLY DEPENDENT UPON THE AMERICAN FARMER TO PROVIDE ITS DAILY BREAD.

- THE AMERICAN FARMER PROVIDES FOOD FOR MORE PEOPLE FOR LESS MONEY BY FAR THAN ANY OTHER FARMER IN THE WORLD. IMPROVEMENTS IN TECHNOLOGY, KNOW HOW AND GOOD OLE AMERICAN INGENUITY UNDER THE "FREE ENTERPRISE SYSTEM" HAS MADE THIS POSSIBLE. WE MUST NOT ONLY PROTECT BUT PERPETUATE THAT FACT AND ONE OF THE IMPORTANT ELEMENTS TO MAKE THIS A REALITY IN FLORIDA AGRICULTURE IS THE CONTINUATION OF GOOD DEPENDABLE AND RELIABLE WEATHER DATA AND INFORMATION.

THE INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES (IFAS) AT THE UNIVERSITY OF FLORIDA JUST RECENTLY COMPLETED AN EXTENSIVE STUDY ABOUT "FLORIDA AGRICULTURE IN THE 80'S" HAVING TO DO WITH FLORIDA AGRICULTURE IN THE NEXT DECADE. I WAS FORTUNATE TO HAVE HAD A PART IN SOME OF THE DELIBERATIONS IN THE SERIES OF REPORTS CONTAINING PROJECTIONS FOR THE FUTURE OF FLORIDA AGRICULTURE. I AM TAKING THE LIBERTY OF QUOTING FROM A SPECIAL REPORT BY "THE AGRICULTURE AND THE FLORIDA ECONOMY COMMITTEE" INCLUDED IN THIS IFAS STUDY REGARDING THE FUTURE OF FLORIDA AGRICULTURE:

> "THE DEVELOPMENT OF FLORIDA AGRICULTURE TO ITS CURRENT LEVEL, DID NOT OCCUR BY CHANCE OR BECAUSE OF ANY UNIQUE HISTORICAL ADVANTAGES. IN FACT, FLORIDA AGRICULTURE DEVELOPED IN SPITE OF ENORMOUS PROBLEMS OF SOIL FERTILITY, PESTS AND DISEASES. OVERCOMING THESE PROBLEMS REFLECTS ON THE INGENUITY OF FLORIDA FARMERS AND SUPPORTING RESEARCH AND TECHNOLOGY. CONTINUED GROWTH IN THE FUTURE IS LIKELY TO BE AT LEAST AS BIG A CHALLENGE AS HAS GROWTH IN THE PAST."

- I BELIEVE THIS CONFERENCE COULD BE THE VEHICLE THAT MIGHT MAKE THAT CHALLENGE A LITTLE EASIER. SHOULD WE DO ANY LESS?

Mr. LEWIS. Thank you, Mr. Teets.

Mr. Dan Richardson.

Mr. RICHARDSON. Gentlemen, my name is Dan K. Richardson. I am president and chairman of the board of Gracewood Fruit Co., a family owned and operated grove and packinghouse operation.

I have been past member and chairman of the Florida Department of Citrus, our Citrus Commission, and I am going to briefly give you the practical side.

You have had a lot of the technical information and sitting here listening to it with you it has been very interesting and informative, but I would like to give you the practical side from the grower's angle of the problems we have.

I think that I will start by saying that I originally was born and came from New York and around New York, so I am going to assume that when I came here 37 years ago I didn't know any more about citrus than you know now.

I am from the east coast of Florida where we have shallow root systems; consequently we have to bed our trees up. We put our trees on double beds or single beds, and on each side of these beds we have furrows. These furrows drain into ditches and the ditches drain into canals, and it consequently ends up in the river someplace. This is the way we get the water off.

We also use these same furrows and ditches and canals to irrigate with and to put the water back into them.

We use reservoirs, wells, pumps, different methods of getting water to put into the groves. The only way—not the only way, but by far the majority of the way we protect ourselves against freezes is by putting the water back into these furrows.

Now, over in the center of the State, on the ridge, as we call it, they use different methods, wind machines and different things like that. But over here we have never done that, and the water does help us considerably, but in order to get this water into those furrows we need 3 days' notice.

It takes us from 36 to 48 hours to get the water into these furrows, to get it there sufficiently to do the job that needs to be done; consequently we need 3 days' notice.

So to say we can get it on the radio or we can hear what is going to happen tomorrow is not good enough for us. For us to make a decision to put this water in—and in my particular case, and you can see the acreage I have there, which is a relatively small amount in the overall picture on the east coast—to start putting that water in I just would estimate it would cost me someplace between $25,000 and up.

Now, that is not a big problem. In 1982, January 12, we had a major freeze, probably one of the most devastating freezes that we have ever had on the east coast, and we lost in our own operation someplace between 200 and 300 acres of grove that were killed to the ground. We lost a lot of leaves and we lost a lot of fruit, but we definitely lost that much acreage that we went out and had to replant.

The acreage, you can put an estimated cost someplace between $6,000 to $8,000 an acre. Now we flooded the best that we could, but there is no way that you can get enough water to flood all of your acreage. You can't. There is just no way to get it, with everybody getting the water at the same time, so we try to make a decision on where to put the water and we do the best we can with it.

If I could have gotten enough water and had enough time I probably could have saved 200 to 300 acres of grove. And I could have saved thousands and thousands of boxes of fruit, but I couldn't get the water. But I was able to do a substantial job in saving probably 1,000, maybe 2,000 acres of groves.

Now, you multiply this by what we are talking about in this one small operation, and then multiply it by the State, and you can see the type of money we are talking about.

You have heard figures mentioned here, but this is the practical side of it. This is the side that I have had to go back and replace these trees, and if we didn't have this information and we have a telephone connection into Ruskin in which we get a tape recording that they have on all the time, and they change that tape every time they come in with a new forecast, and we monitor that hourly, and somebody was asking, I believe the chairman asked, what can you do to improve the weather service.

Well, to improve the weather service it would help us if we had more accurate reports. But you can only do what you can do with the technical knowledge we have. If they make a mistake by a few degrees and they don't predict that it is going to be as cold as it gets, which has happened, in 3 days we can lose a great number of trees and acreage.

If they predict that it is going to get colder, say 2 or 3 degrees, then it actually gets, we have wasted our money in many cases trying to protect ourselves.

But when you look back, in 1895 there was a freeze—I don't think we know exactly how cold it got, but it wiped out the entire industry in Florida of cirtus. The only thing that was left was a small acreage out in Merritt Island in Cocoa.

Now, from there we have got to where we are today, and I am sure 20 years from now we are going to have more accurate services than we have today and it is going to be helpful to us; but to turn this over to a private enterprise, and this has been mentioned many, many times, is putting, in a sense, the growers, not only of citrus, but everything that has been mentioned here, and everyone else is affected very similarly.

I am sure it is putting us in a position where we hope it will work, we hope there won't be a monoply on it, we hope they won't raise the price so high that some of the small growers will be forced out of business, and we hope that it won't be so high that we are going to have to raise the price to the consumer.

There is an awful lot of ifs in this and, as was mentioned before in the testimony here, we paid for this once; it doesn't seem to make sense that we have to go back and pay for it again, and I speak of "we" as the public, because whatever we pay for, the public is going to have to end up paying for.

So basically that's the practical side from a citrus angle, and that is our problem. If we didn't have the information we have, and we have had three very bad freezes in the last 5 years which is most unusual—we had the freeze of 1977 which was bad; we had the freeze of 1981, which was not quite as bad; but we had the freeze of 1982 which really was devastating to us on the east coast, and the west coast, and we lost, in the industry, we lost thousands of acres of groves, to say nothing of the amount of fruit we had.

Even with this service it is not perfect, but it is a great help to us.

Mr. **Lewis**. Would you yield just a moment, please?

I think, Mr. Richardson, it might help some members of the panel to understand your concerns better if you explain to us a little bit more about losing the groves, what a freeze does to your trees. A freeze does not just wipe out the oranges on the trees, but it can also wipe out the trees?

Mr. **Richardson**. When you lose the grove, when you lose the trees, say we lost 300 acres, that means we have to go push the trees out, go back and replant it. It takes from 5 to 6 years for a tree to grow to a position where we can realize any money back from it, putting the cost of your fertilizer and expense of everything you do to it, plus the cost of the tree, so this is just added on to the top of it.

A replaced 200 acres of trees in 1977 and now in 1982 I had to go back and replace 300 acres, and this costs to get a tree from when it is planted to when it is producing, costs someplace between $5,000 and $6,000—$6,000 an acre.

Now, if I had lost 2,000 acres of trees, which I could have lost without this information, I would have been out of business.

As it is, with the high interest rates and having to borrow money to do this, it has been a very close marginal deal, and some people, it has wiped them out; and other people, they have had to go to the banks, they have had to go to outside sources to get money.

So the Florida citrus industry is in a very close margin position right now. Hopefully we are going to come back with a big crop of fruit next year and it looks pretty good. When you have 3 freezes in 5 years it does hurt and, without the Weather Service I think many of us would have been wiped out; there is no question about it.

So you are not talking about a million dollars; you are talking about many millions of dollars, and you are talking about what might happen to the entire industry and to the consumer as far as citrus goes.

I am sure when you put this into vegetables and other farming, it, as we mentioned here, gets to be an astronomical figure which people really can't conceive.

I am nervous about saying if we do this it might work, on the one hand. On the other hand, I feel strongly, as most farmers do, that we want to be independent; we don't want Government to come in and tell us how to run our business; we don't want support of Government; but this is one case that only the Government can do the job and it makes sense to me that this is one of the cases that we have spent the money already, why should we have to do it again.

[The prepared statement of Mr. Richardson follows:]

G

GRACEWOOD
FRUIT COMPANY
P. O. BOX [illegible] [illegible] AVENUE [illegible]

Statement of
Danforth K. Richardson
President
Gracewood Fruit Company
Vero Beach, Florida
March 31, 1983

My name is Dan K. Richardson. I am President and Chairman of the Board of Gracewood Fruit Company, a family owned and operated grove and packing house operation. We have approximately 6,500 acres of citrus in Indian River and St. Lucie Counties. I have been active in the citrus industry since 1946.

During this time we have been completely dependent on the National Weather Service to keep us informed on the type of weather we can expect both short and long term. At the present time we pay a fee to the Indian River Citrus League, which is an East Coast grower organization, so that we might have a direct line to the National Weather Service in Ruskin, Florida. They, in turn, pay a fee to the weather service to supply us with direct lines. The Ruskin station has a tape recording which, it is my understanding, they change twice a day updating their short term and long term weather information. In this way we are able to keep updated on frost and freeze warnings. It is of vital importance to us that we have at least three days frost and freeze warning information.

I am assuming that you know nothing about the citrus industry or how the groves on the East Coast protect themselves from freezes so I will explain in detail why this is important to us. The groves on the East Coast, having a shallow root system, must be planted on what we call either double or single beds with furrows on each side of the bed. With these furrows we drain the water into ditches and then canals to take off the excess water. With these same canals, ditches and furrows, we add water from different means, such as reservoirs, pumps and wells to flood the groves and irrigate them during dry times. The way that the large majority of growers in this area protect themselves against frosts and freezes is to flood their groves through these ditches and furrows, thus raising the temperature in their groves. In order to do an effective job of flooding, we need at least three days' notice since it takes at least 36 to 48 hours to get enough water in these groves to do an effective job.

If we did not have this three days' notice from the National Weather Service, we would lose a substantial amount of fruit and trees due to the freezing weather. During the freeze of January 12, 1982, we personally lost quite a few hundred acres of grove basically because we were not able to get enough water into all of our groves. On the other hand, we saved thousands of acres from freezing because we were able to get information in time to flood most of our groves. I think it is safe to say we are a typical average grove operation on the East Coast, and you can say that all the groves in this area had the same situation. One of the problems, of course, is that you can never get enough water to do a complete job of flooding all of the groves in a three day period. I might also add that the '82 freeze was the most severe freeze that the East Coast has had since they have been keeping records. In the 37 years that I have been active in this business, we have had a number of freezes of one degree or another, and because of the advance notice that we have received from the National Weather Service, we have been able to cope and survive these freezes.

It is my understanding that the vegetable industry has a similar problem, and I am sure they depend on the National Weather Service as much as the citrus industry does. The citrus industry, being the second largest industry in the State, has a very substantial economic effect on the entire State. I know in my community when the industry has had hard times such as low production from freezes, well as low prices, due to many factors, the entire community is affected. This can be multiplied many times through all communities in our State. I am sure all tax payers are in agreement that the Federal and State governments should make every effort to cut down unnecessary expenses, and that the private sector should pay their fair share in services they receive. Not completely understanding all the intricacies that are involved in obtaining National Weather information, I can only say that I can not see how the private sector could gather this information without the help of the National Weather Service who has the technical equipment that has been developed and paid for through the years by the public. It is my understanding that the expense for the service in Ruskin, Florida has been reduced 50%, which I am heartily in favor of. However, to do away completely with the valuable service that Ruskin gives to the industries of Florida, as well as all its citizens, would be completely devastating and would leave, certainly the citrus industry, very vulnerable.

I would certainly hope that some kind of a compromise could be reached where we could still get the information that is so vital to us that only the National Weather Service can provide, and possibly in some way we could pay our fair share for receiving this information.

Respectfully submitted,

Dan K. Richardson
President

DKR:emb

Mr. LEWIS. Mr. Beardsley.

Mr. BEARDSLEY. Gentlemen, I am David L. Beardsley, and even though I am listed on your witness list as president of Hendry County Farm Bureau, and I am also newly elected director of Florida Fruit and Vegetable Association, I was asked to and I am glad to be here to be able to speak to you today strictly from my viewpoint as a small sugar cane farmer.

Now, I am going to give you the practical and field side of the cane business, as Mr. Richardson just gave you the citrus.

A little bit of background is covered in my presentation. Our family has been here and pioneered in the Glades area. We roughly began to grow cane predominantly after U.S. Sugar Corporation invited neighboring farmers to produce cane for them to grind.

The figure of 1934 is wrong in the statement. It is really—my mother read the statement and said no, it is 1938, so that is a typo. Over the years, up to the 1960's we progressed to where cane became the predominant crop on our farm, just like it has in the entire Everglades agricultural area.

Today we farm and harvest roughly 750 to 800 acres of cane a year. In the Florida industry, some people call us a small grower; some people call us medium size.

As I mentioned, we had moved strictly to cane as our primary crop. There are several reasons. One basic one is the stability of the price of sugar over the past 45 years. Another is that cane is primarily the most efficient use of the soil and conditions in the area; and third one, and why I am leading into this background is that cane, the cane plant itself is a relatively tolerant crop. In 45 years of farming on our farm we have suffered through floods, droughts, hurricanes, freezes, insects, and diseases, the whole gamut, but we have always harvested a crop; we have always gotten at least a portion of a crop in. We have never been totally wiped out.

That is part of the reason why we grow cane in this area. It is not to say we can't suffer a loss, just like every other farm. As a result, to us, weather predictions are not as much a life or death status as they are to the vegetable and citrus growers; at least that is my personal opinion. They are more of an aid in preventing losses.

Several ways we use that as an aid in prediction of weather has been mentioned in the growing stages of the crop, but the primary uses are in protection against freezes, and during our harvest operations, if we know a freeze is coming, just like everybody else, we raise our water levels; that is our primary response to adverse weather, almost any adverse weather condition.

Our farm is in the position where turning on our pumps unnecessarily is not going to give us financial or production-wise adverse effects. So if we think there is even a remote chance of a freeze we go ahead and do that.

During our harvest operations it is an advantage to us to know the wind directions, the possible shifts in wind, and especially if it rains, after this past season, if a rain is coming.

This aids in burning of the sugar cane field prior to their cutting by hand, or, on machine operations, and it also will help you decide whether you want to harvest another field that is a little drier condition than the one you are in.

As an idea to give you what can happen, like Mr. Richardson did with his citrus groves there, to give you an idea of what knowing about the weather before hand can do for you, early on the morning of December 19, 1981, I learned that the frost that was predicted that night was going to be a hard freeze.

I might note that I learned that through the early morning TV weather report and then also through a neighbor who has access, direct access to a NOAA and a color radar terminal. On that day we were in the process of preparing 120 acres, which is 16 percent of our land, for successive planting.

The seed cane for this job was in a colder area with little protection from Lake Okeechobee. As a result, we immediately moved out cutters to cut the seed and lay it down on the ground and, with the warmth from the earth, covered it up with a little bit of trash and tops provided us to bring the seed through.

If we had lost the seed, our options would have been, one, to let these fields that we were planning on planting lay fallow until we could plant them the next fall. That would have reduced the next year's crop and the income from that crop by 18.5 percent.

I debated this morning whether to give you a price dollar amount for that and I decided I might as well. That would have come to roughly between $100,000 and $150,000, in that bracket. I will give you that much.

Our other option was to buy seed, if there was any available, if there was any in the entire area. That would have roughly run, the cost for that seed, to between two to three times the value of what my seed would have been if I had been able to use it. Dollar amount for that would have been about $15,000 to $18,000 additional cost.

That is just an example of the ways that we use, you know, knowledge of what the weather is going to do on that date.

Presently our major use, on my farm and out in the field, primarily in all the cane areas, is the NOAA, Clewiston Tower, or station, and the use of these small radios that specifically pick up NOAA stations.

Frank can probably tell you better what a fight it was to get the Clewiston station, so that we could have a localized weather report for that tremendous agricultural area out in the Glades.

Other prospects of what I use personally are strictly local TV and radios and, like I say, my neighbor has access to the color radar terminal and NOAA terminal.

But I might note that to me the only real local prediction is the one that I get on my NOAA radio.

I might note that my neighbor, even with his sophisticated equipment, has had—his advance warning times vary, especially with rains; he cannot always tell when the rain is going to jump on him. The other thing is that he has had unpredicted frosts occur, ones that were not predicted, so even that system has some faults.

This past fall I was approached in a letter by the Florida Weather Services, Inc., with the proposal at the same cost areas as what he mentioned this morning, but I felt that to me that was a little bit too high on a yearly basis and it just had not, to me, been tested in our local area or at least I did not know of any specific cases, and personally I would rather spend that money on being able to improve my water pumping capabilities.

If the NOAA station in Clewiston is on the immediate removal list, I doubt if I will return to or turn over to a private weather service.

What I will do probably is make a personal point of watching the national and local weather TV reports and try to make my own diagnosis from the jet stream and other factors that we glean from them.

In the possibility that you, the legislature, do drop the program I have got an immediate alternative which may be a little off the wall. How about having a request to the local television stations that early in the mornings when they are not running programs, instead of a test pattern, why don't they run the radar pattern or perhaps the NOAA station?

There are local stations that have done that in the past. I don't know if any are doing it at the amount. I think I would get up for it. I think a lot of my neighbors would, too.

You asked if anybody else listens to or uses the NOAA system. For me out in the field, I can tell you that any time that somebody walks in and sees one of these things they have one within a week.

In our area, like I say, it is very localized; it is the best local predictions we can get, and every pilot and small personal plane, I think, has one that I know of, and it also gives marine forecasts for Lake Okeechobee, and I don't know of any other service that does that in the public sector.

Finally I would like to reiterate—those families who have been in this area in the Glades for 50 years remember the hurricanes and think that these, even in the last few years, have been a blessing and a help for those people during the hurricane, even though the hurricanes have not been strong.

That is all I have.

[The prepared statement of Mr. Beardsley follows:]

PREPARED STATEMENT OF DAVID L. BEARDSLEY

Gentlemen, I am David L. Beardsley and I appreciate the opportunity to speak to you today as a small surgarcane farmer concerning weather information services.

As a little background, my family has been farming in the Glades area around Clewiston, Florida since 1914. My great grandfather and grandparents pioneered on the shores of Lake Okeechobee and cleared our land for farming.

We began to raise cane when the United States Sugar Corporation first invited several neighboring farmers to become independent growers of cane for their Clewiston mill. This was in approximately 1938. The percentage of cane on our farm, in relation to other crops such as cattle, hogs and vegetables, increased slowly until the early 1960's. Then we became, and have remained, almost totally a sugarcane grower.

Today, we farm roughly 1,000 acres, from which we harvest between 750 to 800 acres of cane yearly. In relation to other growers and mills in the Florida sugar industry, we are of a small-to-medium size.

There are several reasons why sugar production has become the dominant crop on our farm, just as it has in the Everglades Agricutural Area. One is the stability of the price of the product over the past fifty years. Another is that cane is one of the most efficient uses of the muck soils and growing conditions in the area. And just as important is the nature of the cane plant, itself.

Cane is a relatively tolerant crop. In fifty years of floods, droughts, hurricanes, freezes, insects, and diseases, we have always had a crop harvested. We may lose a part of our crop acreage or have the quantity and/or quality of our cane decrease due to weather problems, but, contrary to vegetable growers, we have yet to lose a whole crop. This is not to say that we cannot suffer a large economic loss from adverse weather. That is a fact any farmer lives with. It is just that we have hedged the odds of being completely wiped out, by the fact that we produce sugarcane, as opposed to other crops.

As a result, weather predictions are not of as great a "life or death" requirement to us. They are more of an aid in preventing losses. Thought helping in the growing stage of the crop by telling us if sprays or fertilizers may be washed or blown away, accurate weather predictions aid us most in protection against freezes and during harvest operations.

If a freeze is coming, about all we can do to protect our crop is to raise our water level. We are not in the position where turning on our pumps unnecessarily (if it does not freeze), will harm us (production-wide or financially).

During harvest operations, it is advantageous to know wind directions, possible wind shifts, and if a rain is approaching. This aids in the burning of the fields prior to cutting and it may determine whether to move operations to another field.

As a rather unique example of possible losses prevented by knowing the weather beforehand, let me relate this experience. Early on the morning of December 19, 1981, I learned that the frost predicted for that night would be a hard freeze. We were in the process of preparing 120 acres (16 percent of our land) for successive planting. The seed cane for this job was in an outlying colder area with little protection from Lake Okeechobee. We immediately moved cutters from our harvest operations to cut this seed and lay it on the ground and were thereby able to save the seed and successfully plant the fields. If we had lost the seed, my options would have been to: 1. Let the fields lay fallow until planting the next fall, thereby reducing the next year's crop and income therefrom by 18.5 percent, or 2. Buy seed, if any was available, at a cost of twice the value of my seed. Either way would have been very costly.

Presently we monitor the weather on the NOAA Clewiston station, local television and radio stations, and occasionally receive warnings from our neighbor, who has both NOAA and color radar terminals. I might note that the only local predicitions are those of the NOAA station.

Our neighbor, who has both a NOAA and color radar terminal (at a cost I would guess to be in the $25,000 plus range), is large enough to afford it. But the question still remains whether the benefits are worth the cost. Advance warning times vary with conditions and unpredicted frosts have occurred since they got their system.

This past fall I was approached by Florida Weather Service, Inc. to provide our farm with their reports at a cost of either $350.00 or $400.00 per month on a yearly basis. I felt that this was too high and questioned its value to use on a year round basis. I would rather spend this amount of money on improving our water pumping capabilities since water control is our most important response to all adverse weather conditions.

If the NOAA station in Clewiston is removed, I will return to a daily practice of viewing the national and local weather patterns on the nightly television news. I will rely more on my own diagnosis. I do not foresee turning to a private weather service.

In the possibility that the legislature decides against continuing this program, might I suggest a possible alternative. Request local television stations to run weather radar patterns and/or NOAA reports during non-program hours early in the morning, instead of just running a visual test pattern. This may help stations build public service points with the FCC. I believe some stations are presently doing this and since most farmers are early risers, they would probably use it.

In conclusion, I would like to point out that people other than farmers listen to the NOAA system regularly. Almost everyone who sees this small NOAA radio receiver of mine ends up buying one of their own. Do you know that this service benefits only the farm community? Every private pilot of a small plane, that I know, has one of these radios. The Clewiston NOAA station is the only source which I know of that gives a marine forecast and conditions for Lake Okeechobee boaters and fishermen. And the value of this system in a hurricane, to those of us with families who have lived through every storm to hit the Glades from the 1920's on, is immeasurable.

Mr. **Lewis**. Thank you, Mr. Beardsley, Mr. Haley.

Mr. **Haley**. My name is Valjean Haley and I am here on behalf of about 60 of the East Coast vegetable farmers. I was designated as kind of a spokesman or chairman or unofficial panel or whatever Also we are engaged in a little cattle business and ornamentals. So I am covering a wide range there.

I could echo back from what has been said here. The majority of the farmers don't understand how anyone conceived the idea they were going to save money by destroying the eyes of the driver, so to speak.

Just to go on the record, we are asking that you look at what it represents and make your own determination, which I don't think you would want, where the ripple effect of this weather goes far, far beyond agriculture.

If we lose money it has to be purchased somewhere else and so consequently it is not coming out of the farmer's pocket any more than it is coming out of everyone else's pocket.

A lot of people have the idea that their groceries come from the grocery store and if the farmer has a farm there he don't need that, he can go down to the grocery store like everybody else.

We would like to ask that you just evaluate this and we will go on record as saying that we are opposed to any movement in the private sector of this program.

Mr. LEWIS. Thank you, Mr. Haley.

One question I would like to ask any member of the panel: What are the possibilities that the growers will subsidize this agricultural weather service, such as the Ruskin Weather Station?

If you didn't have any Government operation would you contribute to subsidizing a Ruskin type operation?

Mr. HALEY. Could I lead off on that? I represent about 60 small farmers, some black, some Chinese, some of them that are borrowing money on a year-to-year basis, and they are the guys I think we need to protect because those of us that are larger, we can buy these services. But that poor devil that has got to drive the tractor and do the spraying and is the lifeblood of this country cannot go out here and just take it off his income tax.

I don't think it is fair to him. I really would find it objectionable if he was not represented, and he is not.

Mr. LEWIS. Does anyone else care to comment?

Mr. RICHARDSON. Well, one of the problems with farmers is that they are not organized. I would say that the Florida citrus industry is probably the best organized agricultural group in the United States and I think I can substantiate that, having been on the Florida Citrus Commission, which is the basic place where we do everything; we do our advertising, we pay in a tax to the commission and so forth.

They are better organized than anybody else, but basically a farmer, and particularly vegetable farmers, we have associations, we have mutuals, we have vegetable associations and so forth, but everyone doesn't belong to them and everyone doesn't pay into them.

There is no way to go out—you don't have the laws to go out and tax them.

So you might get a group that would get together and subsidize it to some extent, but what is going to happen to the people that don't? You just can't get them organized like you can in most businesses. Farmers seem to be too independent and it would be a very difficult problem to do it.

Mr. **Lewis**. Any other comments? Thank you.

Mr. Scheuer.

Mr. **Scheuer**. It has been an extremely interesting panel, Mr. Chairman, I don't have any further questions.

Mr. **Lewis**. Mr. McGrath?

Mr. **McGrath**. Yes, Mr. Chairman, I have no questions, but just to comment that I think this panel has perhaps articulated as well as any the concerns that we have among the three of us regarding this transfer of technology to the private sector and for the elimination of what seemingly is a minuscule amount of money compared to the big picutre. This is as opposed to the tremendous losses that could occur without the information, without the technology available to the citrus growers and farmers, not only here in Florida but in other areas of the country.

I want to congratulate you, Tom, for having this hearing so that we can bring back to Washington the record of this hearing so that we can share it with our colleagues on the Science and Technology Committee and our chairman, Mr. Fuqua, who I know is sympathetic to this cause because he is a Floridian himself. Between you and Mr. Fuqua and Billy Nelson and Buddy MacKay you have this committee pretty well wrapped up.

We in New York are going to have to make some changes, Mr. Chairman. We are pretty well represented in New York, and I think between New York and Florida we do all right, but, once again I want to congratulate you for having this hearing, for assembling the kinds of people that we have had testify before us this morning and, once again, it was my pleasure to come from New York.

Mr. **Lewis**. Thank you, Mr. McGrath. Thank you, gentlemen.

I would like to point out to all of the people this morning who gave testimony that it was excellent testimony, it was on point, and it provided a lot of information in the gray areas that we didn't have answers for before.

I especially want to thank Congressman Scheuer from New York, who is the permanent chairman of the subcommittee, for allowing me to chair this hearing. Also I would like to express my appreciation to him for allowing the hearing to take place here in West Palm Beach so that we could hear the testimony from growers and other people in agriculture from South Florida who will be most definitely affected by any changes in the current NOAA weather system.

Is there any further business to come before the committee?

If not, this committee will be recessed subject to the call of the chairman.

[Whereupon, at 12:40 p.m., the subcommittee was adjourned.]

APPENDIX I

QUESTIONS AND ANSWERS SUBMITTED FOR THE RECORD

QUESTIONS FOR MR. STILES

1. If the agricultural weather services are no longer funded by the federal government, could the State of Florida provide financial and technical support for the services for use by Florida farmers?

2. Do you think that private industry could provide adequate agricultural weather services for Florida farmers?
   If private industry does provide these services, what would be the cost to the farmers?

3. Presently, how many Florida farmers utilize the agricultural weather services?
   What are the cost benefits of the agricultural weather services to Florida farmers?

4. One criticism of the agricultural weather services is that it benefits only a single industry. What benefits, either directly or indirectly, do non-farmers receive from the agricultural weather services?

5. Nationally, farmers are in serious economic dificulty. What is the general economic status of the farmers in Florida?
   In your professional opinion, could Florida farmers afford to pay for agricultural weather services and if so, to what extent?

QUESTIONS FOR MR. STILES AND HIS REPLIES:

1. If the agricultural weather services are no longer funded by the federal government, could the State of Florida provide financial and technical support for the services for use by Florida farmers:

   *This would be very difficult to do today through the regular programs we have. If it were funded, it would invariably be through a joint program of some type, similar to Market News information or Crop and Livestock information by way of an agreement with a Federal agency. Furthermore, the Florida Legislature is in Special Session now and funds could not be appropriated, realistically, until July, 1984.

2. Do you think that private industry could provide adequate agricultural weather services for Florida farmers?

   *Private weather services with fewer services and limited accessibility could be afforded only by the larger producers. There would be no quality control standards nor uniformity of service. Public forecasts (radio and TV) generally are not accurate or specific enough for farming decisions and primarily cover urban areas.

   If private industry does provide these services, what would be the cost to the farmers?

   *At present this can not be quantified, however, only the largest producers could afford it. For example, Florida Citrus Mutual probably could, but then would be unable to transmit this information to their many thousand members.

3. Presently, how many Florida farmers utilize the agricultural weather services?

   *Growers of some 52 major commercial products utilize the services. Total investment in agriculture is more than $20 billion covering over 41,000 farms.

   What are the cost benefits of the agricultural weather services to Florida farmers?

   *The value of estimated crop loss to Florida agriculture, which can be saved by timely weather forecasting, is estimated in a recent study (April 8, 1983) to be $120,000,000. This would not include such things as permanently damaged citrus trees which must be replanted and take years to mature.

Sources at the Ruskin Weather Station furnished the following information: The cost for five agricultural meteorologists is $160,000. Full staffing, which includes a computer programmer, is from $200,000 to $220,000 per year.

Using the $120,000,000 loss figure and the $160,000 staffing figure, a cost-benefit for each dollar spent would be $1:$750, and using the full staffing figure of $220,000, the cost-benefit ratio is $1:$545.

4. One criticism of the agricultural weather services is that it benefits only a single industry. What benefits, either directly or indirectly, do non-farmers receive from the agricultural weather services?
*Small plane pilots have radios that pick up the NOAA system regularly. Marine forecast and conditions for Lake Okeechobee boaters and fishermen are given. And many families in the area tune into the system when in the path of a hurricane. To them this service is immeasurable.

5. Nationally, farmers are in serious economic difficulty. What is the general economic status of the farmers in Florida?
*In 1982, there were 259 completed foreclosures, bankruptcies and liquidations in Florida. Probably the great majority of farmers in the state are suffering from cash flow problems today.

In your professional opinion, could Florida farmers afford to pay for agricultural weather services and if so, to what extent?
*The smaller farmers are the ones who are going to lose because they won't be able to pay for this information from other sources. Some larger ones are at the present time through private sources.

QUESTIONS FOR MR. HUTCHESON

1. You work daily with farmers who utilize agricultural weather services. What are the benefits of these services to the farmers in Palm Beach County?
   What would be the impact on farmers if these services were discontinued?

2. What are some of the improvements or types of research needed in order to increase the effectiveness of the agricultural weather services?
   Do you think that private industry could provide these improvements? If so, what would be the cost of these services to the users?

3. How large are the cost savings, in Palm Beach County, from the fruit frost and other agricultural weather services currently provided by the Ruskin Weather Station?

4. Farmers are in serious economic difficulty nationwide. What is the economic status of the farmers in Palm Beach County? Could they afford to pay for agricultural weather services and if so, to what extent?

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AGRICULTURAL EXPERIMENT STATIONS
COLLEGE OF AGRICULTURE

REPLY TO
531 North Military Trail
West Palm Beach, FL 33406
June 15, 1983

RECEIVED
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WASHINGTON OFFICE
JAMES H. SCHEUER, M.C.

Representative James H. Scheuer
Chairman - Subcommittee on Natural Resources,
Agriculture Research and Environment
Suite 2321 Rayburn House Office Bldg
Washington, DC 20515

Dear Representative Scheuer:

The following is in response to your letter of May 25, 1983 regarding the hearing held in Florida on the Agriculture Weather Service.

The benefits of the Agriculture Weather Service to farmers in Palm Beach County were addressed on pages one and two of my written testimony before the committee.

If this service were discontinued, there would be a lack of information on potential frost and freezing nights, interpreted for agricultural use, causing a gap in the farmers' decision-making process. The resulting damage could be in the millions of dollars. With adequate time and information, farmers can do things to minimize damage to their crops.

On page four of my written testimony, research needs are addressed. In my opinion, private industry cannot afford to do the necessary research. Even if they could perform the research, the resulting cost would have to be passed on to their customers and would be prohibitive for most farmers.

The value of weather information provided to growers by the Agriculture Weather Service in Ruskin is addressed on page one of my written testimony. The value could be as high as $150 million on a freeze night.

Farmers, in Palm Beach County, have the same economic problems as other farmers in the United States. Each year we have some farmers who do very well and others who are on the brink of bankrupcy. These persons change from year to year. This is, primarily, in our large vegetable industry where weather and prices can never be predicted.

Many farmers, the more successful ones, could afford to pay some amount toward the provision of weather services. The small farmers who can't afford it might be affected to the extent that they would go out of business. A system might be devised whereby a farmer pays based on the acreage he has in production. This would be a cumbersome system to administer but it would provide access to the information for all, large or small.

If you have any further questions, I would be happy to try to answer them.

Sincerely,

Clayton E. Hutcheson

Clayton E. Hutcheson
Extension Director
Palm Beach County

Questions for Mr. Ball

Q. 1. It has been suggested that the private sector's agricultural weather services would lack NOAA's well developed communications system and would therefore be inadequate. Would you please comment on this?

A. Quite possibly true. Private sector serves selectively using telephone.

Q. 2. If agricultural weather services are provided by the private sector, there is a possibility that the research necessary for improvements may not be provided. Do you think that the private sector would make the commitment to conduct the necessary research?

A. Don't think private sector has the money to do it.

Q. If so, what would be the cost to the users?

A. Tremendous.

Q. 3. The range of agricultural weather services that could be provided to farmers will vary. Could you describe the various types of services that the private sector could provide and the cost of each to the users?

A. I will cover this by a separate letter at a future date. However, a 2-day forecast, 3-day outlook daily package is about $350 to $400 per month.

Q. 4. Do you currently receive your weather data from the government at no cost?

A. I pay taxes and therefore nothing is free.

Q. What do you feel would be a reasonable price to pay for the services that you now receive?

A. We should not pay because no one knows how to assess cost. What's most important is that access to the data without a user's fee permits many small weather firms to exist and provide jobs for people. Frankly, to hell with users fees—very phony—Ron S. Ball, Jr.

QUESTIONS FOR USER PANEL

1. Do you think that private industry would be capable of providing the same quality of services to the growers that the National Weather Service currently provides?

   If not, do you think that, over time, the private sector would adapt and become as effective as the Weather Service?

   What are the possibilities that the growers might be able to subsidize the agricultural weather services of the Ruskin Weather Station?

2. How large are the cost savings, state-wide, from the fruit frost services currently provided by the Ruskin Weather Station?
   Are there other benefits to farmers that are provided by the Ruskin Weather Station?

3. What are the plans of fruit growers in other areas of the country for obtaining fruit frost services in the future?
   Are farmers willing to pay user fees for agricultural weather services?

4. If the Weather Service were to abandon its agricultural weather services, the Department of Agriculture might institute its own agricultural weather program. Do you think that the Department of Agriculture's weather program would be fragmented and inadequate when compared to the Weather Service's program? If so, please explain why.

FLORIDA FARM BUREAU FEDERATION
POST OFFICE BOX 730 - TELEPHONE 378-1321 - GAINESVILLE, FLORIDA 32602

June 1, 1983

Dr. James Green
Committee of Science and Technology
Room 388, House Office Building, Annex #2
U. S. House of Representatives
Washington, D. C. 20515

Dear Mr. Green:

My testimony is correct to the best of my knowledge as presented, transcribed and recorded. I will attempt to answer the user panel questions as to the best of my ability.

QUESTION:

1. Do you think that private industry would be capable of providing the same quality of services to the growers that the National Weather Service currently provides?

   If not, do you think that, over time, the private sector would adapt and become as effective as the Weather Service?

   What are the possibilities that the growers might be able to subsidize the agricultural weather services of the Ruskin Weather Station?

ANSWER:

I do not think the private industry will ever duplicate or equal the same quality service that the National Weather Service currently provides. I say this because of the tremendous expense necessary to hire qualified meteorologists, purchase satellites, equipment, collection data, etc. needed to extrapolate data and interpret and disseminate timely information to different regions of the country. The initial cost would be astronomical and the subscriber cost to recoup this expense, plus turn a profit, would be cost prohibitive to the user.

With private industries competing for subscriber service, there would be no uniform standards or practices and eventually one company would surface and monopolize this service. I feel that, exclusive of cost, private industry eventually could develop the expertise comparable to the National Weather Service ... but, again, the cost factor cannot be ignored.

Growers, I feel, would be willing to subsidize the Agricultural Weather Services of the Ruskin Weather Station if necessary; however, I feel they should be given some form of tax credit for doing so as their tax dollars are being spent to support other NOAA projects, which serve as no direct benefit to them. If user service is contemplated, then it should be applied across the board and not restricted to agricultural users.

QUESTION:

2. How large are the cost savings, state-wide, from the fruit frost services currently provided by the Ruskin Weather Station?

   Are there other benefits to farmers that are provided by the Ruskin Weather Station?

ANSWER:

The cost-savings statewide have to be related in terms of approximate as there are no scientific gauges or results to determine this. I would, conservatively, estimate that the value of accurate weather information (including early frost warning) to the state's agricultural industry would approach the $300 million level annually.

This figure represents approximately 10% of the value of cash receipts at farmer level for fruits and vegetables. The cost at retail level would be many times this figure.

The benefits are numerous in addition to early fruit frost warning, i.e.,

Haying - Hours of sunshine information, dampness, straw conditions, heat units, drying conditions, etc.

Forestry - Burn and fire control conditions .. emergence of insect population.

Labor Scheduling - Farmers have to pay "stand-by" time if workers cannot work once called, due to unexpected weather change.

Integrated Pest Management - Emergence of disease, insect population, weather conditions for ideal breeding periods.

Aerial Applicators - Knowing wind speed, volicity for spray drift ... farmers knowing whether to spray preceding rain forecasts, etc.

Planting Times - Knowing when best germination period arrives.

The list goes on and the uses are numerous.

QUESTION:

3. What are the plans for fruit growers in other areas of the country for obtaining fruit frost services in the future?

   Are farmers willing to pay user fees for agricultural weather services?

ANSWER:

It is my opinion that most growers in Florida do not really think the federal government will eliminate such a valuable service; particularly when they read where billions are spent so wastefully and this program is so useful and actually saves the government money by keeping farmers in business and employing many workers (most of which pay taxes).

They are, for the most part, not making any plans ... some have checked private services, but the cost ($350 month) is cost prohibitive.

QUESTION:

4. If the Weather Service were to abandon its agricultural weather services, the Department of Agriculture might institute its own agricultural weather program. Do you think that the Department of Agriculture's weather program would be fragmented and inadequate when compared to the Weather Service's program?

If so, please explain why.

ANSWER:

I think the entire Agricultural Weather Service, including fruit frost and fire weather functions, should be placed under the Secretary of Agriculture with appropriate authorized funding. The USDA had agricultural weather from 1890 to 1940, so the idea is not new, but perhaps one whose time has arrived again.

It would take a great deal of coordination and cooperation between Commerce and USDA at the outset, but I strongly feel USDA would have greater understanding and priority to not only maintain the program, but put high priority to upgrade services available. I strongly feel this is the area in which emphasis should be placed. I think in order to maintain continuity, EVERYTHING relative to agricultural weather, including personnel, should be transferred to USDA by a date certain.

I hope these answers and opinions will assist in making the proper decision relative to this matter.

Sincerely,

Dennis E. Emerson

Dennis E. Emerson
Assistant to the President

DEE:bk

SOUTH BAY GROWERS, Inc.
Winter Vegetables from Florida
P.O. DRAWER A SOUTH BAY, FLORIDA 33493 TELEPHONE 996-2085

June 4, 1983

Dr. James Greene
Subcommittee on Natural Resources
Agriculture Research and Environment
Room 388
House Office Building - Annex #2
U.S. House of Representatives
Washington, D.C. 20515

Dear Dr. Greene:

Per the request of Chairman Scheuer, herewith is my response to questions presented in his letter of May 25, 1983.

1. (a) Private industry in all likelihood would not be able to justify the direct expense necessary to duplicate and operate the sophisticated equipment developed by the Federal Government. The American people have already paid for the expensive cost of development and start-up. I don't think it would now be fair to sell the present system at 25 or 50 cents on the dollar and let private enterprise provide information only to those willing to pay. The quality of information would not keep up for long, because more private funding would be directed to operations and less would be directed to research, which has been a great help in making the National Weather Service the best on earth.

   (b) The private sector will never be as effective in the weather service area, as this is one justified case of the Federal Government doing something which the states and individuals cannot do for themselves. The present product of the National Weather Service is free for all who desire to use it and not to the few who would have to pay extra for the same or lesser service.

   (c) The growers already subsidize the Ruskin Weather Station through general taxes, which I believe is one of the justifications for the present tax levels. I am certain if Ruskin operations were not budgeted, there would not be a corresponding reduction in taxes. Given the option, some large growers may elect to subsidize Ruskin, but the vast majority of small farmers already hard pressed would not be able to contribute to such a program.

A Subsidiary of United States Sugar Corporation

2. (a) A quantitative measure of the cost savings from the fruit frost services is beyond my ability to respond. Rest assured the savings run into multimillions of dollars in recent years. Knowing what time and how severe weather is going to be in a few hours into the future determines whether a grove owner should fire or water or gamble on getting by.

(b) There are many benefits provided to farmers other than citrus farmers. The State of Florida abounds with the production of tomatoes and a multitude of other vegetable crops, as well as being the largest domestic producer of sugar cane. All of these operations rely almost totally on the Ruskin Weather Service for both long range and short range forecasting. Florida, after all, provides about half of the fall, winter, and early spring production of fresh vegetables for the Nation.

3. (a) I have no specific knowledge of what fruit growers in other areas will do to obtain fruit frost service in the future. My area of concentration is fresh vegetables, and in the course of business, have had many California growers express concern about the loss of weather service. This same concern is also expressed by many Texas growers who operate in the Rio Grande valley.

(b) Farmers have had to more and more absorb user fees, both state and federal, in their operations. The general feeling is that they should receive some benefit for the taxes they pay, and having weather information readily available is one of the most important services provided by the government. Let's face it, most of the government a farmer sees is of a regulatory or adversary nature. The weather service is one thing he needs that the Federal Government can provide on a cost effective basis and offsets the effect of his tax money funding various programs that seem to work against him rather than for him. Farmers may ask the question is it fair for them to pay a user fee when aviation and shipping do not.

4. I cannot hazard a guess as to how effective the Department of Agriculture would be in providing a cohesive weather service for the Nation. It would seem rather redundant, however, if one department had to develop agricultural weather, one aviation weather and another marine weather. It would seem like a real waste of money and effort to maintain three separate weather services when one could operate as the source for all. For a weather service to

be adequate, the research for forecasting all weather is the same; there are no short cuts. What happens in the atmosphere directly determines what happens on the ground and water surfaces of the earth. It seems to me, a stand alone system funded by any department of government would have to unnecessarily be duplicated by any other department doing the same task.

If I may be of further service to the work of the committee, please feel free to request further response.

Sincerely,

SOUTH BAY GROWERS, INC.

Frank D. Teets
Frank D. Teets
Vice-President
General Manager

FLORIDA FRUIT & VEGETABLE ASSN.
President

FDT/rjh

Q. 1. (A) Do you think that private industry would be capable of providing the same quality of services to the growers that the National Weather Service currently provides?

A. 1. (A) I would say no to this question.

Q. 1. (B) If not, do you think that, over time, the private sector would adapt and become as effective as the Weather Service?

A. 1. (B) It is very possible that the private sector would adapt and become effective over a period of time, but what the expense would be could very easily be so excessive that the average grower could not afford it and, as was pointed out at the hearing, the public has already paid for all the technical knowledge and equipment, such as satelites that are used. It seems unreasonable to expect them to have to pay an excessive amount for the use of this service.

Q. 1. (C) What are the possibilities that the growers might be able to subsidize the agricultural weather services of the Ruskin Weather Station?

A. 1. (C) This might be possible but it could be so expensive that the average grower could not afford it and, once again, we have already paid for this information - why should we have to pay for it again.

Q. 2. How large are the cost savings, state-wide, from the fruit frost services currently provided by the Ruskin Weather Station?
Are there other benefits to farmers that are provided by the Ruskin Weather Station?

A. 2. There is no way to give any reasonable figure to this question. If we did not have the weather station and had not been aware of the freezes that have developed over the past five years, it is reasonable to assume that from 25%-40% of our industry could have been frozen to the place where the trees would have had to be replaced. You are talking about billions of dollars to do this, and what the consumer would have to pay for

A. 2. fruit and orange juice while this was being done certainly goes into the billion dollar figure.

Q. 3. What are the plans of fruit growers in other areas of the country for obtaining fruit frost services in the future? Are farmers willing to pay user fees for agricultural weather services?

A. 3. I am sure there are plans in other areas for obtaining this information, but I am not familiar and am not in a position to answer this question. As far as the farmers being willing to pay user fees for agricultural weather service, the answer is yes. We are already doing this to some extent.

Q. 4. If the Weather Service were to abandon its agricultural weather services, the Department of Agriculture might institute its own agricultural weather program. Do you think that the Department of Agriculture's weather program would be fragmented and inadequate when compared to the Weather Service's program? If so, please explain why.

A. 4. It is very possible that the Department of Agriculture might institute its own agricultural weather program if the Weather Service were abandoned, but I do not think that they could in any way duplicate the quality of service that we get from the present Weather Service program. If they were forced to do this, it would take them a long time to gain the expertise in both manpower and know how to even come close to duplicating the present program. They do not have the money to compete on the same scale as the National Weather Service and, from an organizational and logistic problem, I think it would be most inadequate.

Florida Citrus Mutual
TELEPHONE (813) 682-1111 · P. O. BOX 89 · LAKELAND, FLORIDA 33802

BOBBY F. McKOWN
EXECUTIVE VICE PRESIDENT

May 31, 1983

Honorable James H. Scheuer, Chairman
Subcommittee on Natural Resources,
Agriculture Research and Environment
Committee on Science and Technology
U.S. House of Representatives
Suite 2321 Rayburn House Office Building
Washington, D. C. 20515

Dear Congressman Scheuer:

Thank you for your letter of May 24, 1983 requesting questions and answers for the record relative to the important frost warning service as it relates in particular to the Florida citrus industry and Florida agriculture.

I am pleased to submit my answers to the questions as outlined in the attached document.

I have submitted the questions and my answers to Ms. Carolyn Rumery, along with the corrected copy of my testimony.

If I may provide any additional information or data, please call on me.

Warm personal regards.

Sincerely,

Bobby F. McKown
Executive Vice President

McK:vb
enc.

RECEIVED
[illegible] 1983
WASHINGTON OFFICE
JAMES H. SCHEUER, M.C.

QUESTIONS AND ANSWERS FOR THE RECORD
MR. BOBBY F. McKOWN

1. You argue that private industry would be incapable of providing the same quality of service to the growers that the National Weather Service currently provides.

    a. Do you think that, over time, the private sector would adapt and learn to be as effective as the Weather Service?

No, I do not believe the private sector can adapt and learn to ever be as effective as the federal Weather Service. First, the private sector must and shall continue to be dependent upon the federal weather forecast service for basic data in order to provide further amplification of the federal weather services. They do not have the capital to maintain and utilize satellites, micro stations, etc. I believe that the private sector is and will continue to be an augmentation of the federal weather service program, as they depend upon facilities like Ruskin for raw data and feeder systems for their evaluation and forecasts. If the federal government does not continue to provide the basic resources for developing the latest technology for weather forecasting, then the state of the art cannot and will not be developed via the private weather services.

Florida Citrus Mutual also believes that if a firm had all of the agricultural frost warning service business, the total fees would not provide economic stability for long term involvement and business continuity. There would be many services, fragmented and less than capable of providing detailed, accurate narrative frost warning service data. A big, big problem is how to communicate accurate data to growers in a timely manner. The private sector cannot, where the U.S. government can.

Florida Citrus Mutual further believes that weather is of universal interest to every member of the population, the U.S. government, state governments, and is also a vital step in our cooperative stance with other countries of the world in sharing weather data.

In view of the complexity of weather information, the utilization of satellite programs and the dissemination of these weather data, it is imperative that the federal government maintain its weather forecast services and the fruit frost warning program as well.

    b. What are the possibilities that the growers might be able to subsidize the operation of the Ruskin station?

There are always possibilities that the growers might be able to subsidize the operation of the Ruskin station; however, the fruit frost warning service is a small part of the overall function of the Ruskin facility. As well, we do not have statutory taxing authority. Cattle, vegetables, ornamentals, nurseries, foliage operators, etc. would also have the benefit of the service and we do not know of any viable economical means to collect equitable fees.

We have investigated user fees and determined that the collection process would be cost prohibitive; in fact the collection system itself could cost more than the current funding of the frost warning service at Ruskin.

Florida Citrus Mutual also advances its strong belief that Florida Citrus growers already pay for the service in federal taxes, and in fact this is one of the very few services available to our members. We are not subsidized nor price supported.

2. How large was the cost savings, state-wide, from the fruit frost services currently provided by the Ruskin station?

The Florida citrus industry sustained a 25 percent loss in our citrus crop during January 11 - 12, 1982, and if the frost warning service had not been available, we could have suffered a 50 percent loss. Cost factors involved in protecting Florida citrus and other agricultural crops from freeze damage require substantial investment of time, labor and fuel; therefore an economic impact of accurate up-to-date agricultural forecasts becomes paramount when considered from this standpoint. Three basic types of freeze protection are utilized in the Florida citrus industry: heaters, irrigation, and wind machines. Each type of system has a particular risk-benefit factor, but all three are almost totally dependent on the availability of agricultural frost and freeze forecasts and the ability to disseminate those forecasts to those who will use them -- the growers.

Based on information developed by the Polk County Agricultural ERxtension Service (an extension of Institute of Food and Agricultural Sciences, University of Florida), the following cost parameters give an indication of the tremendous fuel expense involved in protecting citrus and emphasizes the need for agricultural forecasts:

	Cost per acre/per hour
Heater Protection	$302.00
Irrigation	.93
Wind Machines	.50

Computed on the basis of an estimated 30,222 acres of protected grove in Polk County alone, the hourly cost to employ the various systems would amount to approximately $221,313 per hour. This is only one of 32 citrus producing counties located in Florida.

Depending on the severity of a freeze, a system would likely operate from between four and eight hours on a given night.

Two other factors should not be overlooked:

The estimates shown here represent only the cost for fuel to operate the various systems and do not include any capital investment, nor added labor expenses.

Finally, the projections outlined in this report relate to only one county in Florida - Polk - and represent only a portion of the overall investment and operating expenses incurred in protecting this state's citrus industry.

Clearly, for every hour a grower may delay the operation of one of these systems he is conserving money, fuel and energy. But in order to make those important decisions, growers must have accurate and timely weather information disseminated in a manner that can be used effectively.

Please be further advised that we have approximately 850,000 acres of planted citrus growing in Florida, and approximately 70 percent of the total acreage has some form of irrigation, which could be utilized in frost protection. Approximately 10 percent of the acreage could be fired with grove heaters, and then a smaller percentage utilizes wind machines. Florida Citrus Mutual sets forth that the cost/benefit ratio to the Florida citrus industry is projected at 1:17 for every hour delay of frost protection. The savings accrued to Florida growers and U.S. consumers as a direct result of the utilization of the Ruskin frost warning service would reach into the hundreds of millions of dollars.

3. Have you been in contact with fruit growers in other areas of the country, such as California, Texas, and Washington?

    a. What are their (California, Texas, and Washington fruit growers) plans for obtaining fruit frost services in the future?

Yes, Florida Citrus Mutual has been in contact with fruit growers and organizations in the states of California, Arizona and Texas. All of us researched the possibilities of alternatives in the event the national frost warning service should be discontinued, and in the early stages we all were optimistic that possibly the private sector could be utilized on a sound basis. However, after full review, California, Arizona, Texas and Florida jointly concurred that the national frost warning service is the most efficient and viable delivery system available.

4. Dr. Washington, a member of the National Advisory Committee on Oceans and Atmosphere, also testified on March 9. He stated that, if the Weather Space Service were to abandon its agricultural weather services, the Department of Agriculture would probably institute its own fragmented agricultural weather program. Do you agree?

I agree with Dr. Washington that pressure would probably come to bear within the Department of Agriculture to institute an agricultural weather program and I must say that I agree with him that at best it would be a fragmented program. Florida Citrus Mutual would not support this position at this time inasmuch as we stronghly believe that the current frost warning service within NOAA is a cost efficient system and it would be a duplication of effort to have another agency involved at this time.

However, should NOAA abandon the frost warning service, then I am sure we would be looking to Agriculture to assist in developing a viable weather program. I must reiterate again, though, Florida Citrus Mutual strongly supports retention of the current weather program.

FCM 5/31/83

APPENDIX II

ADDITIONAL STATEMENT SUBMITTED FOR THE RECORD

THE VALUE OF THE RUSKIN WEATHER STATION'S AGRICULTURAL SERVICE SYSTEM TO FLORIDA AGRICULTURE

Accurate forecasts of minimum temperatures are vital to the Florida fruit and vegetable growers when it comes to cold weather. With 24 to 36 hours' advance warning of frost or freezing weather, these farmers can harvest early to save their crops, but they also help conserve diesel fuel and electricity for heaters and blowers by indicating when they are needed to ward off the frost.

Professor James E. Newman, Extension Climatologist at Purdue University, stated that in his citrus studies in California and Florida he found there to be a major loss once every ten years.

Cultivation, harvest and irrigation must be altered well in advance of frost or freeze. A three day forecast allows enough time for extensive flooding.

Many cold protection practices have a direct relation to energy costs. Pumping to raise water levels in ditches, to provide overhead sprinkling, to run low volume irrigation systems and to burn heaters, result in large fuel expenditures. As far as can be determined, no one has very exact figures for Florida agriculture relating to this or the necessary labor to perform the tasks.

Florida Citrus Mutual provided the following cost figures for freeze protection. Heater protection costs growers $302 per acre per hour; irrigation, 93¢ per acre per hour, and wind machines 59c per acre per hour. Some growers use more than one type of protection, some use none. Of 40,257 acres in Polk County alone, 30,222 acres are protected. Polk County is the largest citrus county, however, there are 31 more. The average cost per acre for Polk County growers is $221.30 per hour. A severe freeze occurs when temperatures below 28° are sustained for four to eight hours per night for one or two nights. Florida Citrus Mutual could not disseminate warnings to 15,000 growers every hour and the private weather services do not give hourly lows.

With a freeze comes economic chaos, and the weather warnings give growers some economic leeway to provide protection and thus remove some of the chaos.

A severe freeze also brings a market loss. One-third of the citrus acreage is covered by irrgation and at least half of it is used for frost protection. There are over 10,000 wind machines and each covers ten acres. They can be utilized and sprinkling systems and flooding systems used if the growers are supplied with timely information.

For mid-western states a 5% figure is used by such respected authorities as Professor Newman as the value of crops saved by weather information being disseminated. However, Florida crops, such as citrus, vegetables, and nursery products are certainly a lot more fragile. In this report 6% has been used for these products, and it is probably on the conservative side, and 4% for sugarcane. These percentages were suggested by a member of the University of Florida staff.

The value of estimated crop loss to Florida agriculture which can be saved by timely weather forecasting is estimated on the following page to be $120,000,000. This would not include such things as permanently damaged citrus trees which must be replanted and take years to mature.

Sources at the Ruskin Weather Station furnished the following information. The cost for five agricultural meteorologists is $160,000. Full staffing which includes a computer programmer is from $200,000 to $220,000 per year. The entire U.S. Agriculture Weather System costs $1,000,000 per year, and the frost protection program for Florida, Texas, and California, $209,000. This is funded through September 30, 1983.

Using the $120,000,000 loss figure and the $160,000 staffing figure, a cost-benefit for each dollar spent would be $1:$750, and using the full staffing figure of $220,000, the cost-benefit ratio is $1:$545. It is imperative for Florida agriculture and U.S. consumers in general that the agricultural weather service system be continued.

FLORIDA

Crop		1981 Acreage	1981 Wholesale Value		% of Est. Crop Loss saved by Weather Forecasts		Value of Estimated Crop Loss
Nursery Products:							
Pompon Chysanthemum		240	$ 6,350,000				
Gladioli		3,550	13,150,000				
Foliage Plants		2,550	162,158,000				
		6,340	$ 181,658,000	x	6%	=	$ 10,899,480
Citrus		749,700	$1,389,319,000	x	6%	=	$ 83,359,140
Limes		6,200	$ 10,239,000	x	6%	=	$ 641,340
Avocados		9,300	$ 16,264,000	x	6%	=	$ 975,840
Mangos		1,650	$ 3,336,000	x	6%	=	$ 200,160
Strawberries		3,000	$ 27,888,000	x	6%	=	$ 1,673,280
Vegetables:*							
Snap Beans	37%	18,200	$ 13,126,490				
Cabbage	58%	10,000	15,316,640				
Celery	42%	5,200	18,499,740				
Escarole-Endive	42%	3,100	4,707,780				
Lettuce-Romaine	47%	7,600	16,443,890				
Sweet Corn	19%	10,700	10,203,570				
Cucumbers	43%	5,460	15,263,710				
Eggplant	21%	650	1,886,430				
Green Peppers	30%	6,200	18,800,700				
Squash	26%	4,000	5,955,040				
Tomatoes	34%	15,500	86,423,580				
		86,610	$ 206,627,570	x	6%	=	$ 12,397,654
Sugarcane		334,400	$ 234,235,000	x	4%	=	$ 9,369,400
		1,197,200	$2,069,566,570				$119,516,294
					Use		$120,000,000

*For Winter Vegetables, only the % havested during December, January, and February was used. The acreage reflects these three months and the correct percentage was applied to the total value of the crops to determine the value for these months only, i.e., for snap beans 37% of the total value of $35,477,000 = $13,126,490.

Sources:

"Weather Services and the Nation's Economy," Don Witten, NOAA, Winter, 1982.

"Cash Receipts from Farming, Florida Agriculture," October 14, 1982, Florida Crop and Livestock Reporting Service.

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Florida Agricultural Statistics, Field Crops Summary 1981, Florida Crop and Livestock Reporting Service.

Florida Agricultural Statistics, Citrus Summary 1982, Florida Crop and Livestock Reporting Service.

Marketing Florida Ornamental Crops, Green Foliage Plants, Summary 1981 Season, Federal-State Market News Service.

Marketing Florida Ornamental Crops, Fresh Flowers and Ferns, Summary 1981-82 Season, Federal-State Market News Service.

Telephone conversations with:

Professor James E. Newman, Extension Climatologist, Purdue University.

Professor J. David Martsolf, Institute of Food and Agricultural Sciences, University of Florida.

Mrs. Virginia Betts, Florida Citrus Mutual.

Professor Max Langham, Food and Resource Economics Department, University of Florida.

Dr. Charles L. Jordan, State Climatologist, Florida State University.

Mr. Chuck Eggleton, Meteorologist, Ruskin Weather Station.

Mr. Fred Crosby, Meteorologist in Charge, Ruskin Weather Station.